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CONTENTS.

PAGE
ADVERTISEMENTS 65
INDEX OF APPLICATIONS FOR PATENTS 65
REVIEW—
  Palmer on Thames Floods 68
PROPULSION OF TORPEDO VESSELS 68
ENGINEERING ON THE THAMES 68
MEAKIN'S SASH-PULLEY OF THE FUTURE ... 69
FIRE-PROOF FLOORING 69
PROPELLING VESSELS 70
OLIVER'S PATENT URINAL AND LAVATORY BASIN 71
PROCEEDINGS OF THE INSTITUTE 72
MONTHLY NOTICES 72
AMENDMENTS OF THE PATENTS FOR INVENTIONS BILL 73
FOREIGN SCIENCE 74

PAGE
PROCEEDINGS OF SOCIETIES—
  Royal Society 75
  Chemical Society 75
  Geographical Society 75
  Society of Antiquaries 75
  Meteorological Society 75
  British Archæological Association 75
  Zoological Society 75
  Geological Society 75
  Asiatic Society 76
  Royal Society of Literature 76
  Royal Institution 76
  Society of Arts 76
  Photographic Society 76
  Institution of Civil Engineers 76
  Society of Engineers 76

PAGE
Proceedings of Societies (Continued)—
  Microscopical Society 76
  Physical Society 76
  Mathematical Society 76
  Quekett Microscopical Society 76
  Linnean Society 76
  Entomological Society 77
  Statistical Society 77
  Astronomical Society 77
  Anthropological Institute 77

A FOUNTAIN ON A SPIRE 77
RECENT AMERICAN PATENTS 78
APPLICATIONS FOR LETTERS PATENT 78
ADVERTISEMENTS 80

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Paints, Colours, Varnishes, Glazes and Lacquer; Painting, Colouring, and Varnishing.—J. C. Martin, 1300

Paper, Pasteboard, and Papier Mâche; Paper Hangings.—A. Masson, 1285. E. Hely, 1321. J. Fraser, 1380.

Pens, Penholders, Pencils and Pencil Cases.—W. Footman, 1146. W. E. Wiley, 1259. E. G. Brewer (com.), 1349.

Petticoats, Skirts, Wearing Apparel for Ladies, Dress Suspenders, Collars.—T. R. Rossiter 1148. W. Hazell and R. Day, 1506.

Photography and Photographic Apparatus.—C. D. Abel (com.), 1264. W. L. Wise (com.), 1284. W. Morgan-Brown (com.), 1367.

Pipes, Tubes and Syphons; Joining Pipes.—E. Peyton and T. Bourne, 1202. T. Verstraeten, 1209. J. McConnell, 1271. J. Tannahill, 1286. C. M. Justice (com.), 1313. C. D. Abel (com.), 1388. W. Byram, 1431. A. Scott, 1448. J. Shaw, 1480.

Pistons and Piston Packings.—C. D. Abel (com.), 1388.

Plates, Dishes, Cups. Saucers.—H. Brittain and W. Albright, 1343.

Ploughing, Digging, Clod Crushing, Land Rolling, Harrowing, Agricultural Implements, Tilling and Cultivating Land.—J. Haughton and S. Peile, 1281. J. Howard and E. Bousfield, 1497.

Preserving and Hardening Stone, Wood, Metals, &c.—H. C. Batchelor, 1188.

Preserving and Preparing Articles of Food.—R. H. Rose, 1132. G. E. Acklom, 1157. G. Kent, 1189. M. Chapman, 1203. W. Froud, 1215. T. Bradford, 1267. F. Lecourt and A. Guillemare, 1374. J. Eckhart, 1414. A. M. Clark (com.), 1421. J. Nadal, 1436. J. Jeyes, 1474. H. A. Bonneville (com.), 1531.

Presses; Compressing.—H. A. Bonneville (com.), 1309.

Printing and Transferring; Type and other Surfaces for Printing, Composing, and Distributing Type.—J. Hird, 1260. C. G. Squintani com.), 1400. W. J. Ingram, 1419.

Propelling Carriages.—L. Hill, 1408. R. Hardie and J. James, 1410.

Propelling Machinery, Transmitting Power and Motion, Converting Movements.—J. C. Mewburn, 1277.

Propelling Ships, Propellors, Paddle-wheels, and Screws.—A. Wilson, 1373.

Pulleys.—J. H. Johnson (com.), 1500.

Pumps, Pumping and Raising Water and other Liquids, Pumps, Pistons, and Packing, Ships Pumps, Beer Engines.—W. Bell and C. Blagburn, 1158. T. Morgan (com.), 1167. H. Wippermann and G. Lewis, 1179. J. F. Brinjes, 1250. W. R. Lake (com.), 1308. A. Carr and J. Arthur, 1334. R. Johnson, 1428. W. Morgan-Brown (com.), 1503.

Railways, Permanent Way, Rail Joints, Chairs and Sleepers, Portable Railways, Atmospheric Railways, Switches, Points, Crossings, and Turnables.—E. P. Alexander (com.), 1133. H. W. Cook, 1153. P. O. Whitehead, 1208. J. E. Ethinger, 1231. W. R. Lake (com.), 1508.

Railways, Carriages, Coupling, Uncoupling, and Altering Position of Carriages and Engines.—H. W. Cook, 1153. S. Partridge, 1164. J. Le Grand, 1325. G. D. Peters, 1389. J. Pickering, 1477. H. A. Bonneville (com.), 1531.

Reaping, Mowing, Making Hay, Gathering in Produce.—W. Mc. I. Cranston (com.), 1316. B. Samuelson (com.), 1471.

Reflectors for Lamps, Reflection of Light.—J. W. Cryer and G. Button, 1339. T. H. Collins, 1453.

Refrigerating, Cooling Liquids, Making Ice.—G. Kent, 1189. J. Henderson, 1213. J. W. Froud, 1215. G. F. Redfern (com.), 1226. J. C. Mack, 1439. H. H. Bonneville (com.), 1531. H. Janig, 1547.

Registering, Indicating, and Marking.—T. Sturgeon, 1280. C. D. Abel (com), 1388. J. S. Clarke, 1399. F. W. Jones, 1459.

Retorts, and Crucibles, Melting Pots.—A. M. Clark (com), 1127.

Roadmaking and Paving, Cleaning Streets.—E. P. Alexander (com.), 1133. S. Robinson, 1205.

Safes, Strong Rooms, Safety Vaults, Money Tills.—S. Chatwood, 1136.

Salt and Saltpetre.—J. Jackson and T. R. Mellor, 1405.

Sewing and Embroidering.—A. M. Clark (com.), 1142. E. Brownson, 1199. J. Dabert, 1509.

Shears, Scissors, Clipping and Shearing Animals.—G. H. Taylor, 1214.

Ship and Boatbuilding.—F. W. Brewster, 1112. T. R. D. Bingham, 1151. H. Studdy, 1170. W. Hepple, 1242. N. R. Roskell, 1344. R. Baillie, 1384. C. G. Wade, 1454. J. D. Ellis, 1544. G. Bates, 1588.

Ships' Cargoes (Loading and Unloading).—A. B. Brown, 1383.

Ships (Raising Sunken or Wrecked).—T. Archer, 1552.

Ships' Rigging and Sails, Reefing and Furling Sails, &c.—J. H. Shoebotham, 1460.

Shirts, Collars, Wristbands, Neckties, Scarfs, Drawers, Hosiery.—L. Stean and G. Slater, 1417. A. Taylor, 1437.

Shuttles.—D. H. Chamberlain, 1347.

Sifting, Sorting, Separating.—J. H. Lake, 1232. J. Scott, 1257, W. E. Price, 1426. E. Bazin, 1488.

Signals, Alarms, Communicating Apparatus, Conveying Sounds.—J. J. Hall, 1207. J. E. Etlinger, 1231. J. V. Hope, 1262. J. F. W. and W. W. Brierley, 1487.

Skates, Skating-rinks.—W. R. Lake (com.), 1193. J. H. Bosustow, 1445.

Smoke (Preventing, Burning, and Condensing).—A. B. Verrier and A. E. Banister, 1221. L. Cogan, 1543.

Soap.—T. Waller, 1235. J. Scharr, 1319.

Spindles; Spindles and Flyers.—J. Nicoll, 1182.

Spinning and Preparing for Spinning.—D. Cochrane, 1135. J. Brigg, 1139. J. E. Worsley, 1149. J. Nicoll, 1182. J. C. Walker and J. and J. Stevenson, 1249. F. Arnold and E. Gregoire, 1275. H. W. Whitehead, 1318. A. Pringle, 1331. S. Pitt (com.), 1350. W. T. Garnett, 1370. C. Moseley (com.), 1391. W. Haddan and J. Smith, 1394. H. A. Foster, 1441. T. Townsend, 1463. J. Worth, 1521. R. G. Ackroyd and A. Ambler, 1525. F. Fleming, 1529.

Spray Producers.—A. M. Clark (com.), 1404.

Springs.—M. J. Roberts, 1291. G. D. Peters, 1389. R. Hunt, 1430. T. A. Adamson, 1528.

Stacking and Elevating Agricultural Produce.—J. Betty, 1489.

Stamps and Stamping, Seals, Monograms, Labels, and Tickets; Damping, Cancelling, and Protecting Stamps and Labels.—D. Simpson, 1270.

Steam and other Boilers, Cleaning and Preventing Incrustation of Boilers, Water-feeding Apparatus for Boilers.—T. and W. Sheppard, 1174. W. Jackson, 1248. J. McConnell, 1271. J. Tannahill, 1286. M. J. Roberts, 1291. H. P. Rieth (com.), 1322. D. Phillips, 1366. C. W. Collins, 1372. A. Wilson, 1373. T. Robertson and M. Henderson, 1376. W. R. Lake (com.), 1390. J. H. Johnson (com.), 1398. T. Moy, 1406. A. Scott, 1448. R. A. Wilson, 1516. T. A. Adamson, 1528. W. Smethurst, 1546.

Steam Engines (Stationary, Locomotive, and Marine).—T. Morgan (com.), 1167. C. N. May, 1187. E. J. A. de Bernales, 1212. J. Vivian, 1236. H. P. Rieth (com.), 1322. B. Fowler and M. Eyth, 1351. A. Wilson, 1373. T. and A. Robertson, 1376. T. Moy, 1406. R. Hedley, 1478. A. M. Clark (com.), 1555.

Steering or Guiding Ships, Carriages, Ploughs, &c.—W. B. Thompson, 1159. H. M. Chalmers, 1220. A. Steenberg (com.), 1461. J. S. Russell and H. Lumley, 1481.

Stone and Slate, Artificial Stone and Marble, Grindstones and Millstones.—R. Lees and J. Anderson (com.), 1123. J. D. Brunton, 1254. J. R. Leaver, 1541.

Straps, Driving Bands, and Belting for Machinery.—E. Speechley, 1311. L. V. Maugin and C. M. Mathey, 1514.

Sugar and Syrups; Glucose.—F. A. Bonnefin, 1185. W. R. Watson, 1324. F. O. Matthieson, 1338. J. Jackson and T. R. Mellor, 1405. W. W. R. Lake (com.), 1423. B. Hunt (com.), 1491.

Telegraphs; Telegraph Printing Apparatus.—H. A. C. Saunders and A. Jamieson, 1416. T. H. W. Higgins, 1475.

Tents, Marquees, and Awnings.—N. R. Roskell, 1344.

Thermometers, Barometers, Pyrometers, Salimometers Electrometers; Testing Strength of Fluids.—J. Coquillion, 1171.

Thrashing and Winnowing Grain and Seeds.—C. Robinson, 1261. J. Park, W. Taylor, 1268.

Threads and Yarns.—R. K. Whitehead, 1279,

Tobacco and Snuff, Cigars, Cigar-holders, Pipe and Cigar-lighters, Smoking-pipes, Tobacco-pouches.—W. Hannaford, 1204. A. M. Clark (com.), 1422. F. J. Cheesbrough (com.), 1427. G. W. Jennings, 1537.

Tools.—H. C. Taylor, 1329.

Tramways and Tramway Carriages, Tramway Locomotives.—S. Robinson, 1205. W. D. Scott Moncrieff, 1237. L. Hill, 1408. J. Hardie and J. James, 1410. S. A. Otis, 1434. R. Hedley, 1478.

Wire Making, Wire Ropes, Telegraph Cables.—H. Brittain and W. Albright, 1343. C. Moseley (com.), 1391. G. Bolden and J. Cassidy, 1418. B. A. C. Saunders, 1416.

Valves, Taps, Stop Cocks, Plugs; Regulating the Flow and Pressure of fluids.—A. Collmann, 1129. J. Cotton, 1152. W. Pawson, 1272. J. Wotherspoon, 1287. M. J. Roberts, 1291. C. W. Collins, 1372. T. Moy, 1406. W. W. Kennedy, 1407. E. Kunkley, 1415. A. Barker, 1511. J. Scott, 1520. T. A. Adamson, 1528.

Velocipedes.—C. J. Virgo and A. Akeroyd, 1306. T. F. Hunt, 1449.

Ventilation; Supplying and Purifying Air for Buildings, Mines, Ships, Carriages, &c.—N. Hunt and W. N. Cox, 1198. A. B. Verrier and A. E. Banister, 1221. F. G. Fleury, 1269. R. Adams, 1305. W. Byram, 1431.

Vices, Floor-dogs or Cramps, Cramp Keys, Wrenches, Spanners, and Screw Keys.—A. W. Singer, 1180.

Washing, Cleansing, and Wringing Fabrics, Yarns, and Materials.—T. Bradford, 1267. C. N. Ahlstrom, 1353. W. Birch, 1356.

Water Closets, Earth Closets, Urinals, and Commodes.—G. Schofield, 1137. W. Dray, 1352. E. Pearson, 1375. D. T. Bostal, 1412. G. Fellows, 1507. J. Scott, 1520.

Watering, Supplying, and Distributing Water, Fountains, and Wells.—C. N. Ahlstrom, 1353.

Waterwheels and Engines, Hydraulic Motive Power.—T. Taylor (com.), 1295. A. B. Brown, 1383. J. Swan and J. Hughes, 1450.

Wearing Apparel for Gentlemen. Military Outfits, Tailors' Trimmings.—H. A. Dufrené (com.), 1513.

Weaving, Braiding, Plaiting, Preparing for Weaving.—A. Morton, 1118. J. Lord, 1240. W. G. Threlfall and R. Ashworth, 1256. J. Hurst, W. A. Craven, and H. Sutcliffe, 1312. J. O. Evans, 1330. J. Smith, 1335. J. Holding, 1345. D. H. Chamberlain, 1347. E. and J. Dugdale and W. Mould, 1369. J. Hardaker, 1377. J. O. Evans, 1382. G. Bolder and J. Cassidy, 1418. J. Dabert, 1509. L. Robertshaw, 1524. E. Holt, C. C. Blenkhorn, and A. Stanchcliffe, 1530. A. M. Clark (com.), 1554.

Weighing Machines, Scales, Indicating Weight. T. H. Ellis and H. W. Ayres, 1252. J. Scott, 1257. J. Cheshire, 1432.

Wheels for Carriages and Velocipedes, Railway Wheels, Tires, &c.—W. Spence (com.), 1190. F. Wirth (com.), 1241. J. Offord, 1534.

Wheels for Machinery, Cog-wheels, Cams, &c.—J. H. Johnson (com.), 1500.

Winding, Reeling, and Balling Yarn and Thread.—J. Nicoll, 1182. G. Knowles and J. E. Hamer, 1401. C. A. H. Jonas (com.), 1456.

Window Blinds, Sun Blinds, Fire-screens.—F. J. Costa, 1499.

Windows and Sashes, Window Frames and Shutters, Window Fastenings.—A. R. Nairne and J. Waddell, 1121. W. S. R. Catt, 1200. W. E. Partridge, 1276. R. Adams, 1305. J. T. Harris, 1328. W. Clarke, 1466. P. Jensen (com.), 1473. A. J. Baker, 1517.

Review.

PALMER ON THAMES FLOODS.

"Floods in the Thames Valley, and the Relief of London Bridge and its Approaches." By Francis Ingram Palmer, Royal Navy, Associate of the Institution of Civil Engineers; late Admiralty Surveyor, and Commander of H.M. Indian Government Ironclad *Magdala*. London: Printed by Waterlow and Sons (Limited). 1877.

Mr. Palmer, who has been Commander of an Indian ironclad the *Magdala*, and seen much service in the Hydrographic Department of the Admiralty, comes before the public in his present work upon subjects of much interest, and we feel bound to say that his treatment of them is worthy of the serious attention of all who are interested in the matter; and a large number of persons in the metropolis, independent of public bodies, are so.

In regard to Thames Valley floods, he naturally alludes to damage to property; and, further, he warns us of probable future losses. The main points of his recommendations are, that land-water should be discharged into the tidal estuary during ebb tide, so as to meet the incoming flood, and not during flood tide, as it would cause an extra heading up of water, as illustrated by the extra height of the water at London Bridge as compared with calculations, while the levels at Sheerness were in accord with the calculations. The improvement of the tidal estuary, which has been admirably carried out by the Thames Conservancy Board, he affirms is the cause of the heaping up above referred to, which should be met in the manner he describes.

He considers it advisable to have a straight canal to relieve the river between Windsor and Brentford, and at several smaller bends, both for assisting to carry off flood waters and to give additional storage capacity to that section of the river.

He deprecates the removal of Teddington Weir, and advocates the formation of an additional weir lower down the river.

He shows the incapacity of the river to discharge maximum flood, and considers relief would be afforded by storage of excess. Artificial reservoirs he considers unnecessary, inconvenient, and very costly. The channel of the river is the natural storehouse, and requires but little assistance to render it efficient.

An accurate detail survey he recommends as immediately necessary, and suggests regulation of the river channel, repairs to weirs and locks, and management of river by a competent and active officer provided with telegraphic communication to all parts of same.

With regard to the relief of London Bridge and its approaches, Mr. Palmer falls in with the grossly exaggerated views of those who dilate upon the insufficiency of the bridge for London traffic, which is in reality fairly equal to the requirements of the neighbourhood now that the railways carry so much of the traffic over their own bridges; and Southwark Bridge affords an available easement. He gives a description of a bridge which seems likely to afford facilities which, in this rapidly growing metropolis, could not, however, fail to be very useful.

Reviews Postponed.—The pressure of other matter compels us most unwillingly to postpone several reviews of books well worthy of attention.

PROPULSION OF TORPEDO VESSELS.

Last month we gave an account of the Thornycroft Torpedo Vessel, and since then our attention has been directed to the patent of Mr. Robert Wilson, of the Bridgwater Foundry, Patricroft, in the county of Lancaster, engineer, for certain improvements in screw propellers and in their application to ships, boats, and other vessels, and also in machinery or apparatus for actuating the same, which he describes as consisting in so arranging, constructing, and applying screw propellers, in certain positions and in relation to each other, and in so actuating them that the slip is reduced to the smallest possible amount, and the vibration so much complained of so reduced as not to be felt or even produced from the like cause as that of the propelling action to screw vessels.

To obtain these results I find it is necessary to adopt such an arrangement that the action will produce a similar effect to that of the action of the tail of a fish upon the water, that is to say, that when the water is moved in one direction by the oblique action of a fish's tail, that motion of the water will in like manner be counteracted by an opposite action, which I obtain by a second propeller placed directly behind the first and revolving in the opposite direction, so that a more perfect resistance shall be obtained for the propeller's blades to act against than if the first motion of the water was allowed to continue and to go on unobstructed in the one direction like the revolving motion given to the water when only one propeller is used. These two propellers which I use may each have two, three, or four blades as the case may require; and although they may be of the ordinary forms generally in use with expanding pitch or otherwise, I prefer them to be as near as possible to that of a portion of a thread of a true screw, whether of two, three, or four threads, according to the number of blades employed, so that the forward tendency of each portion of each of the blades when in motion may be exactly the same; and in order to prevent vibration the section of the blades must be such as will give a direct line of screw action and also the least possible resistance in passing through the water consistent with the strength required, as described in the specification of letters patent granted to me in 1861, No. 114.

This principle and arrangement of propellers may be applied as twin screws on each side of the dead wood or rudder, or behind the rudder, or in an opening in the dead wood, like most of the ordinary screw propellers now in use, but instead of that opening in the dead wood being so small as merely to allow space for the propeller I prefer it to be as wide as circumstances will admit, so that the water may have free access to the fore propeller and equally free exit from the after one, and both the main and false stern post bevelled inwards to the opening that the water may enter and leave freely.

The application of the invention to torpedo vessels Mr. Wilson refers to thus, viz.:—This invention is also particularly applicable for propelling the fish torpedo, as by it the highest possible speed can be obtained.

It is also well adapted for canal navigation, as the water is but slightly agitated in consequence of the motion caused by the first propeller being counteracted by the action of the second.

My improved machinery for reversing the direction of the motion of the propellers consists of four bevel wheels, one fixed on the solid driving shaft which gears into two wheels revolving on fixed studs, and these two impart motion to the fourth wheel fixed on a hollow shaft, one propeller is fixed to the solid shaft, which passes through the hollow shaft to which the second propeller is fixed.

Mr. Wilson's invention appears to be similar to the arrangements adopted in the Thornycroft, and on the principle of *palmam qui meruit ferat* we think his name ought to have been mentioned in connection with that remarkable little vessel.

ENGINEERING OF THE THAMES

By Mr. J. B. Redman, M. Inst. C.E.

It is not known whether the Romans or the Saxons carried out the earliest engineering works on the Thames. These were the embankments of the lower reaches, which shut out about 30 square miles of saltings, formerly overflown, but now from 3 feet to 7 feet under high-water spring-tides, representing at the lesser depth 70,000,000 tons of tidal water. The tidal column from Teddington to Gravesend was equivalent to 107,544,643 tons, so that the quantity abstracted might be said to be equal to from five-eighths to three-quarters of that volume. If the water were raised 12 inches in the upper reaches, on an average, by the embankments, one-eighth of the quantity would be returned. The low-water equivalent was even more conjectural, but no doubt the low-water régime had been deepened, and the course of the river had always been the low-water channel.

The removal of Old London Bridge, and subsequently of Blackfriars and Westminster Bridges, created a revolution in the tidal condition. On the Thames, as on the Tiber and on the Clyde, bridge engineering has been antagonistic to river conservancy. Waterloo Bridge is a case in point at the present time. The systematic removal of the low-water shoals, in addition, had developed the flood and accelerated the ebb, and about 37 per cent. had been added to the above-bridge tidal volume. The result was an earlier and a longer flood with increased altitude, and a shorter, lower, and greater scouring agent on the ebb. Five centuries back high-water at London Bridge was three hours after the moon's transit; now it was two hours. During the last two centuries the period of flood had been accelerated one hour and a half; and high water was at present half an hour earlier at London Bridge, as compared with Sheerness, than half a century back. This was mainly due to the removal of Old London Bridge, which had a waterway of 7,300 superficial feet, as compared with 17,600 feet, that of the present structure. This correspondingly impeded the tide, which now flowed higher 12 inches and ebbed 4 feet lower, above bridge than in former years.

The volume of water flowing over Teddington Weir is 3,223,125 tons daily. The present daily quantity supplied to the London Water Companies was 542,958 tons, or about one-sixth of the land water. This was equal to 198,179,670 tons annually, sometimes estimated at 250,000,000 tons. The annual outflow of the river was 1,176,440,625 tons, equivalent to 3½ inches of rainfall over the drainage area of 5,162 square miles. An annual rainfall of 24 inches would yield 8,030,597,142 tons; one-fourth of this amount, after allowing for absorption, evaporation, &c., was 2,007,649,285 tons of available water. This, however, was one and two-thirds the actual result, so that instead of 6 inches of annual rainfall being available, not much more than about one-half, or 3½ inches were so, and this was only four times the quantity required for the Metropolitan Water Supply. The average outflow was equal to from one-sixth to one-seventh of the annual rainfall.

High-water at Sheerness was fixed by Colonel Lloyd, in 1830, as being 2 feet lower, and low-water as being 20 inches higher than at London Bridge; but the tide now ebbed lower at London Bridge than at sea. Great tides had flooded London from an early period, varying from 3 to 4 feet above Trinity Standard. Pepys mentioned that of the 7th December, 1663, thus: "I hear there was the last night the greatest tide that ever was remembered in England to have been in this river; all Whitehall having been drowned." The extreme range at Gravesend was 27 feet. The quantity of tidal water shut out by the Thames Embankments was estimated at 365,000 tons; but they had compensated for it by raising the tidal column, and were thus recuperative. If the water surface from Blackfriars to Teddington had been raised 6 inches, that would be equivalent to 700,000 tons.

To show the impossibility of providing reservoirs for land water, Mr. Symons had estimated that storage for 714,285,714 tons would be required, equal to from three to four times the daily tidal volume from Teddington to Gravesend. The winter flood of 1875 at Windsor amounted to 33,723,925 tons daily, so that Mr. Symons' estimate of storage would be for twenty-one days of the great flood. The average volume of extreme tides from Teddington to Gravesend was 322,500,000 tons, so that the land-flood water was one-ninth of the tidal water, or rather one-eighteenth during the day. The morning and afternoon tides of the 8th of April, 1874, both rose 21 inches higher at Blackwall than at Gravesend, 10 inches higher at London Bridge than at Blackwall, and at Westminster and at Lambeth 4 inches higher than at London Bridge. The present low-water level was from 5 inches to 14 inches lower at London than at Sheerness; and at Gravesend low-water was lower than London by 9 inches, and than Sheerness by 12 inches. The level of highwater for a mean of the 3 years 1873-74-75 was 3 feet 10 inches higher at London than at Sheerness. The spring and neap high-water differences varied from 6 feet to 2 feet. The maximum difference of range in favour of London amounted to 6 feet 7 inches, but usually it was 4 to 5 feet. Thirty years back high-water was 4½ inches to 6 inches lower at Chelsea, and 12 inches lower at Battersea, than at London Bridge, and the low-water level was 15 inches higher. The tide of the 15th November, 1875—the result of the great westerly gale of Sunday, the 14th November—aided by a heavy land flood, was the highest on record, viz., 4 feet 9 inches above Trinity Standard, and exceeded the Admiralty calculated range by 3 feet 3 inches. Of that great tide, from 3 to 4 inches were due to land water. The tide of the 20th March, 1874, rose the same height at Teddington as at Westminster—viz., 4 feet 4 inches above Trinity Standard, rising 18 inches above the land water, with 7 feet oscillation at Teddington, and 12 inches at Kingston; and this tide was 20 inches higher at London Bridge then at Gravesend. The estimate of compensation due to the raising of the tidal column by the Embankments might be largely increased, as the estimate of 6 inches was only taken above a plane, nothing being added for the former fall at high-water above Westminster. There was now an additional depth of 12 inches at high-water from London up to Richmond, where the tide flowed fully as high as in the Pool. Due to the increase of tidal volume and the dredging of shoals, the low-water deep channel had been extended upwards past Woolwich and Blackwall. There are two artificial barriers to its continued extension, or at least to its availability for navigation. The first is the Thames Tunnel, which has only a depth of water of 8 feet over the crown at low-water, with a normal depth above and below of 10 feet to 11 feet, and a similar condition of things exists at Waterloo Bridge. The highest tide of the past year, on the 19th of September last, was at Harwich 3 feet 9 inches, and at Sheerness 3 feet 6 inches below Trinity Standard, while at the London Docks it was 1 foot 7 inches above that standard; the high-water of that day in London being relatively 5 feet 4 inches and 5 feet 1 inch higher than at Harwich and at Sheerness. During the last two years the high-water has been abnormally raised, as also the low-water, due to the vast quantity of land water from the exceptionally large rainfall.

The public importance of this question is evident, when the sanitary character of the river is considered, making London (besides being the richest) one of the most healthy and beautiful cities in the world. The river was also the carrier of a commerce now amounting to nearly 9,000,000 tons annually, which had been doubled in twenty years. The accumulated causes of tidal development, to which reference had been made, produced results of comparatively slow and gradual operation, though they were coming more and more marked every year. During the last half century these causes had added about 33 per cent. to the above-bridge tidal volume, operating twice every twenty-four hours; thus showing the altered condition of the river, and the great improvement thereby affected, attended, however, by the lesser evils arising from the non-embankment of the low-lying portions of the metropolis, and which, as these tidal improvements were developed, would be intensified year by year, and must demand a comprehensive remedy.—*Abridgment of paper read at the Institution of Civil Engineers.*

MEAKIN'S SASH-PULLEY OF THE FUTURE.

Last month we referred to a controversy which has found a place in the *Builder*, between Mr. Meakin and Sir Edmund Beckett (formerly Denison), with regard to this very ingenious and useful invention. We have had laid before us copies of letters and other documents from which it appears that Mr. Meakin, early in April, 1874, called on Sir E. Beckett, Q.C., (then E. Denison, Esq.) with models of a sash-fastener and also of a sash-pulley with oil holes drilled through the bush at the top of the said bush, and in conversation with Sir Edmund, Mr. Meakin explained that he was preparing a pulley so that the oil could be introduced at the face-plate. This it seems was approved of by that gentleman, who in no way intimated that he claimed it as his invention, but so far acknowledged it to be Mr. Meakin's that he termed it "yours," and directed him to Mr. Martineau, the architect of a new house he was building in the country, which led to Mr. Meakin being put in communication with the builders of that house.

Notwithstanding all this Sir E. Beckett writes a letter to the *Builder* on 24th Feb., 1877, claiming the invention as his own, stating therein that the builders of his house have applied a number of pulleys of the same kind, such pulleys having been made by Messrs. Kenrick and Sons of West Bromwich. With regard to which latter statements Mr. Meakin observes that these builders borrowed of him in November, 1874, three or four pulleys for the purpose of submitting them to Sir Edmund; also that Messrs. Kenrick had formerly been employed by Mr. Meakin to make his pulleys, to which end that firm and Mr. Meakin were in communication as early as June, 1874, and that sketches were sent them before 9th March, 1875, and afterwards a mahogany model supplied to them by him; but owing to certain circumstances he transferred his orders from that firm and employed other manufacturers.

After giving careful consideration to the whole of this case and examining the evidence presented to us, we consider that Mr. Meakin's claim to be the inventor of the pulley he has patented stands unimpeached, for we cannot help thinking that Sir Edmund Beckett, who is well known to be a rabid anti-patent-lawite, in his zeal to overthrow a patent, has forgotten his exact position in regard to this matter, and put forward a claim to an invention which the facts of the case do not justify; and, further, that to our mind it is not doing as an English gentleman should do, to allow any one who comes to him with a new invention to go away with the impression that he acquiesces in his claim of inventorship, and then years afterwards to publish his own claim to such invention. Beyond this it is certainly curious that in most of the cases where persons publish inventions as their own *pro bono publico*, they are inventions already subject matter of a patent, or have been previously claimed by some one else.

FIRE-PROOF FLOORING.

The inflammable nature of timber has for many years past led to the extensive use of wrought and cast iron in buildings designed to resist the ravages of fire. The iron is disposed in columns and girders carrying the floors above, which are usually formed of concrete or brickwork. Unfortunately, however, wrought iron, although uninflammable, becomes soft and yielding under heat, and is thus seriously weakened. Cast iron under similar circumstances remains harder, but it is extremely brittle, and if cold water be poured upon it while highly heated it will crack and give way. Hence, in either case in a fire, the supports yield and let down the floors above them. This has been demonstrated over and over again by the demolition of so-called fire-proof buildings by fire, the Pantechnicon, in Motcomb-street, being a very notable example. The advocacy of a return to timber construction may appear strange, but by the light of recent experiments it would seem that there are conditions under which that material can be advantageously employed. These conditions are embodied in the system of fireproof flooring designed by Messrs. Evans and Swain, of 6, Southampton-street, Strand, and which they are now introducing to the public. This consists of forming the floor of solid timbering instead of the ordinary joists and floor boards. The floor is, in fact, all joists, which are laid close together, side by side, and either spiked or screwed through as the laying progresses, so as to form a compact solid mass of timber, capable of resisting the action of fire for a greater or less time. An additional protection is afforded by a thick coating of plaster, which forms the ceiling, the plaster being held up to the underside of the joists either by half-driven nails or by dovetailed grooves in the wood. Staircases are similarly constructed, the timbers forming them, however, being of lighter scantling. In order to practically demonstrate the value of this system, the inventors had a structure run up in 14in. brickwork on the vacant ground on the Thames Embankment near Blackfriars-bridge and on which was laid a test floor on their principle. The test floor measured 14ft. by 14ft. in the clear, and was composed of battens or joists 7in. deep by 2½in. thick spiked together. The floor was here formed by the top edges of the battens, but floor boards can be laid where desired. The interior of the brick structure carrying the flooring was 7ft. high from ground to ceiling, and it had an arched entrance 4ft. wide on one side and four 9in. by 6in. air gratings in two other sides for draught. One-third of the floor was left plain underneath, a second third was plastered, the key being formed by dovetail grooves in the wood, while the remaining third was plastered, the key here being formed by nails half driven. The cracks between the joints were grouted with fine plaster. After standing for about 10 days subject to the recent changeable weather, and the work being still green, the floor was put to the fire test on Monday last. On that day four loads of timber were heaped in the structure and set on fire at 10 o'clock. In a very short time there was a fierce furnace blazing in the building, which for a long time had no perceptible effect on the floor, which externally remained perfectly cool. At 12.35, however, smoke and flame began to issue through the joints of that portion of the floor which was unprotected by a plaster ceiling, and by 1 one o'clock there were signs of leakage of steam and smoke in other parts. A little earth was strewn on these joints, which no doubt were defective through having been badly grouted. By 1.30 the front wall showed a considerable bulge at the side were the flooring was unprotected, and the fire crept up between the brickwork and the flooring. By 3 o'clock. after five hours' trial, the fire had fairly got hold of the unprotected flooring, and a portion of it fell in. It was, of course, useless to expect that the remainder of the woodwork could stand as the flames ate into it sidewise, bringing down batten after batten. About 3.30 a fire-engine arrived, after about an hour's work the fire was got under. The only portion of the floor left was that third to which the plaster was attached by nails and three battens of the dovetailed portion.

This remnant of flooring was about 6ft. wide, and as soon as the fire was got under it was loaded in the centre with about a ton and a half of granite pitching stones, which weight it bore, as well as that of two men who were loading the same on. The base of the pile of stone was 4ft. square, and the load was subsequently increased to 3½ tons, under which weight the flooring gave way. It was then ascertained that the under side of the flooring was charred through for a depth of about four inches, leaving three inches of sound timber. In order to test and compare the action of the fire on iron and wood, an ordinary 7-inch rolled iron joist had been previously placed on supports inside the building directly over the fire and within a foot of the ceiling, a weight of about 3 cwt. being placed on its centre. After being exposed for about one hour to the flames the iron joist became bent and twisted and finally toppled over into the fire in a crippled condition. It will thus be seen that the timber flooring was exposed to such an intense heat and under such conditions as it is hardly possible to imagine could occur at an ordinary fire. In the event of a fire breaking out in any building, in no case would a floor or ceiling be subjected to five or six hours—or even for one hour—to the action of such flames as played upon the experimental floor in question, without any attempt being made to subdue them. It is to be observed moreover, that these results were obtained with a floor of the lightest form, that designed for ordinary rooms, and yet a good margin of safety remained. For public buildings and warehouses the thickness would be 10 in. or 11 in., thus greatly increasing the strength and adding to the security. Considering the intensity of the heat developed, the proximity of the fire to the woodwork, and several imperfections in the brickwork, the flooring may be said to have stood its ground exceedingly well. Messrs. Evans and Swain are to be congratulated on the success of their experiment, which, but for the drawbacks we have mentioned, would doubtless have given still more striking results. The test was a severe one, and the behaviour of the floor contrasts very favourably with that of the wrought-iron joist, which it is to be remembered, was simply resting on supports, and not doing any work. The system of close timbering is not unknown in the United States of America, where railway stations and grain elevators are sometimes constructed of thick timbers spiked together with the view of reducing the danger of fire in that class of buildings.

PROPELLING VESSELS.

Many patents have been obtained for plans of propelling vessels, variation of method and form being almost *ad infinitum*. Amongst these are inventions of forms and arrangements of the floats in paddle wheels, some having them adjustable on the arms to give them the proper amount of dip, others having them set at an angle diagonal to the shaft, others showing pointed paddles; others having paddles set obliquely to the central line of the spokes or arms of the wheel; further others show the paddle wheels made in the form of drums to assist in floating the vessel; but the favourite change from the ordinary style is that known as the feathering paddle wheel, which consists in such an arrangement of the paddles as will allow them to enter and leave the water perpendicularly, so as not to beat it when entering or lift it when leaving, as do the fixed paddles. This is accomplished generally by journalling the paddles to the arms of the wheel, and providing them with guides of various descriptions that compel them to retain a vertical position on entering and leaving the water. A few of such wheels have been and are still used, but have met with comparatively small favour from practical men, as the loss from the beating and lifting of the water is not near so much as is generally supposed. Some of these feathering paddle wheels are submerged and run on vertical shafts, in which case the paddles are set vertically during that portion of their revolution when they act on the water and lay horizontally during the remainder of their motion.

A favourite idea of those who would improve on the paddle wheel is to convert it into an endless chain of paddles passing over two drums at a considerable distance apart so as to have more action on the water than the ordinary wheel. In some cases, the chain is very long and is supported between the drums by fricton pulleys; and in other cases the chain is made so short or is so constructed as not to require the pulleys. In some forms of this device for propelling, there is a single chain of paddles, passing over the centre of the vessel and underneath its centre in a channel between two keels.

Several attempts have been made to displace the paddle wheel by substituting disk wheels, or solid wheels without paddles, acting only by friction as they revolve in the water. These wheels have sometimes been made with single plain disks, others have been provided with corrugated or undulating surfaces: in other cases, two or more disks, set at varying distances apart, have been employed, and in some instances these wheels have been formed of one or more disks, set in an inclined position on the shaft.

Vibrating and sliding paddles have also received much attention from inventors, some of whom so arrange their devices, that, like oars, the paddles descend into and pass through the water, and then rise clear of it before returning to the starting point; others, usually called duck's foot propellers, have their motions all the time in the water, but open out when travelling in one direction, and close up when going in the other, in the manner of a duck's foot; and still others are made of flexible material and work like the tail of a fish. In connection with vibrating propellers, we may state that several patents have been granted for devices for operating oars arranged in such a manner as will allow the oarsman to face the bow of the boat that he may the more readily see in which direction he is travelling.

Screw propellers have been made in almost every imaginable shape and arranged in almost every conceivable way and place. Many patents have been granted for using the screw as a means of steering as well as propelling, which is usually accomplished by connecting the screw to the shaft by a universal joint, and providing it with appropriate guiding mechanism so that it may be turned at any desired angle to the keel of the vessel.

Hydraulic propellers have also had their full share of attraction for inventors. These propellers are made in many different forms, but consist essentially in the use of a tube through the boat provided with some means (usually a screw) of drawing in water at the bow and expelling it at the stern. Sometimes the tube forks at the stem and stern, so that the water may be expelled at either side for steering purposes. By reversing the water-forcing apparatus, and in some cases by changing valves in the tube, the course of the water is reversed, for backing the vessel. Something on the same principle as the above, is the use of a wheel or screw in a channel beneath the boat between two keels, many different styles of which have been patented.

Several patents have also been granted for pneumatic propellers, in which air pumps are employed to draw in air and force it out against the water at the stern. In some cases steam from a boiler, or the force of gases generated by the firing of some explosive substance, is substituted for air and air pumps.

In addition to the above there are various styles of propelling devices adapted to shallow or small bodies of water, as rivers and canals (notably the plan already described in our columns under the heading of "Novel Hydraulic Railway System") among which may be classed rope or rail traction, in which a rope is laid from one end of the route to the other, and is acted on by a wheel or drum on board the boat around which the rope is usually passed. The rope generally lies on the bottom of the canal or stream and either passes over the bow of the boat to the driving power and drops into the water at the stern, or over a wheel at the other side of the boat. Sometimes the rope is suspended above the water, and then is usually clamped between two driving wheels, or between a driving wheel and an idler; and in other cases a chain or a fixed rail (either over the canal, or on its bank, or the canal bottom) is substituted for the rope. In some cases the rail takes the form of a rack, on which runs a pinion driven by power on the boat. As somewhat analogous to this, we may mention that some inventors have proposed to lay rails on the tow path on which a light locomotive, driven by a boiler on board the boat, shall run and tow the boat by means of the flexible steam tube connecting the boiler with the locomotive.

Ground traction propellers of various styles have also been tried, some of which show driving wheels running in self-adjusting frames, so that they will always bear on the bottom of the canal or stream; others have poles driven by cranks or eccentrics; and still others have legs with shoes pivoted at the bottom: but the two last styles are essentially the same in principle.

Air propellers, or screws which act in the air instead of the water, have also been tried and patented, the object being to avoid the washing of the banks in steam propulsion on canals.

Windmill propellers, or rather the use of windmills to drive screws or paddle wheels, have also received some attention; and one of the patentees of such an arrangement has provided an endless chain horse power as an auxiliary force.

Several patents have been granted for wave power propellers, in which the waves, in rocking the vessels, are supposed to drive the screw or paddle wheel. The force of a running stream has been availed of to drive a boat across it with considerable success. In one case, there is a rope stretched across the river, on which run two pulleys connected with the bow and stern of the boat. The pulley at the bow is connected by a very short cord and the one at the stern by a longer one, thus holding the boat obliquely to the rope and the current, so that the force of the latter acting on the side of the boat will propel it across the stream. Another plan that has been suggested consists in attaching one end of a rope to a boat and the other end to an anchor located in the middle of the stream, at some distance above the place where the boat is to cross, in which case the boat travels in an arc, of which the rope forms the radius.

A method of making a boat travel against the stream by the power of the stream itself has been proposed, and it consists in a fixed cable lying in the bed of the river, which cable is acted on by a wheel or drum driven by a paddle wheel or screw impelled by the current. The cable may either have one end coiled up on board the boat, or have both ends anchored, as in rope traction before referred to.

The above gives but an incomplete sketch of the various means devised by the ingenuity of man to propel vessels through the water, for a description, be it ever so brief, of the different modifications of the various plans for propulsion would fill a good sized volume, there being, it appears (according to the *Scientific American*, to which we are indebted for much of the above article), probably upwards of 800 United States' patents for propelling devices, to say nothing of the inventions in other countries for the same purpose.

OLVER'S PATENT URINAL AND LAVATORY BASIN.

SELF-DISCHARGING AND SELF-REPLENISHING.

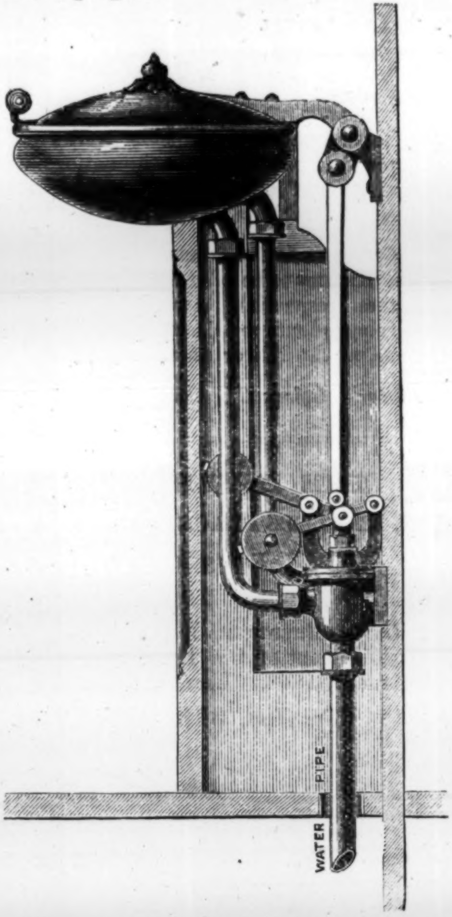
THIS is a very useful invention, which, as shewn in our illustration, is adapted as an "Urinal or Lavatory Basin." It is intended, in the former instance, to be fixed as such in the corner of a water-closet, or other convenient position therein, with a projection from the wall of 15 or 16 inches; or it may be attached to a lavatory, simply, and may be made convenient for club-houses, restaurants, lecture halls, hospitals, workhouses; also in the officers' quarters, and other parts of military barracks, and all other places of public resort, as well as in private dwellings.

In the latter instance, it is intended to serve the purpose of a lavatory basin, and the action is similar to the former, only reversed. It can be used in a lavatory, by itself; or, as in the case of bed-chambers, office-chambers, club-chambers, &c., it can be combined with the former, so that the Lavatory Basin and Urinal may be placed side by side, and enclosed in a neat mahogany casing, having all that is objectionable concealed from the eye, and made to be an object of ornament and taste, but perfectly free from anything offensive.

~~It will be, perhaps,~~ sufficient for this purpose to describe the action of the urinal, as being self-acting—that by lifting the lid for use, the *water* with which the basin is at that moment charged, immediately flows away, by thus opening the discharge-valve. When the hand is withdrawn from the handle of the lid, it begins to descend by reason of the pressure of the balance-lever attached to the piston of the valve, which pulls it down, and it thus closes of itself, leaving a sufficient quantity of clean and fresh water remaining in the basin to secure it against any offensive smells, and guarding it against any impurities.

The action of the Lavatory Basin may be said to be contrary to the above, only as far as that, when not used, there is no water whatever remaining, and the water supplied when used will be regulated according to requirement.

In both of the above instances, the supply of water is drawn from the ordinary supply-pipe of the water company attached to the house, or that may be already laid to the water-closet, or from any other water-pipe that may be more convenient for the purpose.



It may be also desirable to point here to the fact that security is afforded to the water companies against any waste of the water, that the lid is self-acting also, and must descend when the hand is removed from the lid of the urinal and basin; but by means of the regulator, the time of descent is regulated.

Orders have been received for the supply of this article to Her Majesty's Government, and to the Metropolitan Board of Works.

The urinal may be seen complete and fixed, at the establishment of Messrs. Hayward, Tyler and Co., Upper Whitecross-street, London, E.C.

The prices range from £3 to £3 15s., complete for fixing. As to further particulars, application can be made at the office, 86, Victoria-road, Kentish Town, London, N.W.

THE Council of the Iron and Steel Institute have awarded the Bessemer medal for this year to Dr. John Percy, F.R.S., of the Royal School of Mines, in consideration of the excellence of his work on Iron and Steel. It was decided that the next annual meeting should be held at Newcastle-on-Tyne.

A GENTLEMAN has given to the University College of Wales the sum of £200 a year, to be used in whatever way the Council may think best for the promotion of the applications of science to agricultura pursuits.

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President, SIR ANTONIO BRADY.

SESSION 1876-77.

MEMBERS' MEETINGS AT 8.15 P.M.

THURSDAY, 10th May.—Patent Law Conference; if the Progress of the New Patent Bill requires same—or Exposition of Inventions.

THURSDAY, 24th May.—Annual General Meeting at 4 o'clock p.m.

Subscriptions are payable to Mr. G. A. STRETTON, the Receiver, 4, St. Martin's-place, S.W., who is the proper official to give receipts. F. W. CAMPIN, Sec.

N.B.—The movement for the REDUCTION OF PATENT STAMP DUTIES *is still on foot; those who wish to support it should at once communicate with the Secretary.*

Proceedings of the Institute.

ON the 5th of April the Executive Council met as usual, and after passing the minutes of the last meeting, it was decided that the most important business was the completion of the revision of the new Patent Bill, as to which Admiral Selwyn had kindly consented to formulate suggestions; it was therefore resolved that this meeting of the Executive should merge in the Members' Meeting on Patent Laws notified to be held the same evening.

Admiral Selwyn then reported various suggestions as to modifications of the Bill, most of which were in accord with the views of the International Committee and the recommendations of Sir W. Thomson and the Philosophical Society of Glasgow. These suggestions and modifications were unanimously agreed to, and will be found set forth in our principal article given on the opposite page.

The Members Meeting on the 26th April was occupied by reading, and discussion of, Dr. Macdonald's able paper "On Ventilation," a report of which we are obliged to reserve for future publication.

Monthly Notices.

Sun Engines, that is engines driven by the sun's rays, are the talk of the day in Paris. M. Waddington, in a speech at the Sorbonne, is loud in his praise of M. Mouchat's solar engine, and M. Foucault describes an ammonia engine which is to be driven by the heat of the sun.

The Origin of Language and Classification of Languages will be the subject of some lectures by the Professor of the German language and literature, Dr. N. Heinemann, F.R.G.S., F.R. Hist. Soc., at the Crystal Palace School of Art and Science, to be delivered to the students of the school during the ensuing term.

Another new Comet was discovered by Mr. Lewis Swift at Rochester, New York State, on the 11th inst., and afterwards independently by M. Borelly, at Marseilles, on the 14th inst. It was a faint object, in the constellation Cassiopeia, and moving northerly.

Native Silver, in capillary groups, of ruby silver, and brittle silver glance, all embedded in an ochrey lode running through the clay slate, has been discovered at Wheal Newton, in Cornwall. Of the probability of the commercial value of this discovery we have no information.

The Yorkshire College of Science is, it appears, securing for itself a local habitation; the governing body having purchased for £13,000 the Beech Grove Hall Estate, in proximity to Woodhouse Moor and the Leeds Grammar School, as the site for the permanent buildings. The donations to the college have now reached the sum of £42,456.

Proficiency in Qualitative Blowpipe Analysis has been announced as a subject for prize awards by the Society of Arts. As these prizes are intended to encourage the practice of the blowpipe amongst the miners of Devonshire and Cornwall, the arrangements are in the hands of a committee of the Miners' Association of Cornwall, and all intending candidates should apply for particulars to the hon. secretary, Mr. J. H. Collins, of Truro.

The Armour-plate Commission, feeling that the Science Commission allowed Mr. Galton to give evidence before them, reflecting on the members of that commission for, as he considered, the rude manner in which the examinations into the conditions of the iron armour plates were carried out, have addressed a letter to the Duke of Devonshire as President of the Science Commission, which is printed and circulated, requiring a reconsideration of Mr. Galton's statements.—*Athenæum.*

The British Association for the Advancement of Science is now issuing notifications regarding the next annual meeting, which is to be held at Plymouth on the 15th Aug. next, under the presidency of Prof. Alex. Thomson, M.D., LL.D., F.R.S., F.R.S.E.; such notifications being to the effect that intending readers of papers should now make application to the general secretaries, British Association, 22, Albemarle-street, London, W., and should supply, before 1st Aug. at latest, an abstract of the memoir, such as may be suitable for insertion in the transactions. These announcements are made by Mr. G. Griffith, M.A., Assistant-General Secretary, Harrow.

The Royal Society of Literature held its anniversary meeting on Wednesday, 27th April, 1877, when H.R.H. Prince Leopold presided, and read his address, first referring to the flourishing condition of the Society, which well maintains its position as an association of scholars and men of letters, and then to the obituary of the Society, which comprised the names of Mr. E. W. Lane, Prof. C. Lassen Rev. Dr. Bosworth, and Rev. T. Hugo. He spoke in deservedly high terms of the first-named, as an Arabic scholar, of Prof. Christian Lassen as an Orientalist, of the Rev. Dr. Bosworth as an Anglo-Saxon scholar, and the Rev. T. Hugo as an antiquarian. His Royal Highness then referred in terms of encomium to the readers of the Papers during the past Session, namely, the Rev. J. Lang, Mr. Walter De Gray Birch, Mr. C. H. E. Carmichael, Rev. A. D'Orsey, Professor Zerffi, and Mr. G. Washington Moon. After the address the elections took place, the Prince being re-elected, and also substantially the same office bearers as in the past year. The proceedings concluded with a vote of thanks to his Royal Highness proposed by Sir P. Colquhoun, and seconded by Professor Owen, which was passed unanimously.

THE SCIENTIFIC REVIEW

AND

Scientific and Literary Review.

MAY 1, 1877.

AMENDMENTS OF THE PATENTS FOR INVENTIONS BILL (1877), SUGGESTED BY THE INVENTORS' INSTITUTE, THE ARTIZANS' AND INVENTORS' PATENT LAW AMENDMENT COMMITTEE, AND OTHERS.

The following is a statement of the suggestions and objections made to the Bill by the above-named. The clauses are referred to by the numerals. The letters I. I. denote Inventors' Institute, and A. I. C. the Artizans and Inventors' Patent Law Amendment Committee.

The clauses objected to will be found set forth textually in the March (1877) number of the Scientific Review.

On 1, short title; 2, commencement; 3, repeal of the former enactments which are consolidated (*vide* schedule); and 4, interpretation clause; no objections or suggestions are made.

On 5, A. I. C. make no suggestion, but I. I. suggest that the word "salaried" be added to the last line but one, thus making all commissioners (except those who are *ex-officio* commissioners) *stipendiary* commissioners, so as to render them practically responsible.

On 6, which refers to the examiners and assistant examiners, I. I. suggests that the *second and third paragraphs* read thus :—

"The number of the examiners and assistant examiners shall be such as the Lord Chancellor, with the consent of the Treasury, from time to time directs."

"The examiners and assistant examiners shall be appointed by the Lord Chancellor by writing under his hand *with the advice of the commissioners.*"

A. I. C. propose that all reference to assistant examiners be struck out, and that the first paragraph stand thus :—

"The number of the examiners shall be such as the Lord Chancellor, with the consent of the Treasury, from time to time directs, *in order to meet* the requirements of the Patent Office."

On 7, I. I. suggest that the clause stand thus :—

"An application shall be made by filing at the Patent Office, an application, and declaration, and a *brief description* of the nature of the invention (in this Act referred to as the Provisional Specification)."

A. I. C. make no suggestion.

On 8, provisional protection for 12 months, no suggestion is made.

On 9 (Examination), I. I. and A. I. C. desire that the following words be struck out :—" Whether the invention is a proper subject for a patent within the Statute of monopolies," which alteration would if made restrict the first examination to the passing of provisional specification only.

On 10 (complete specification), no suggestion is made.

On 11 (Publication of complete specification, &c.), both I. I. and A. I. C. desire that this clause should read thus :—

"On the filing of the complete specification, the commissioners shall make public the application and the provisional specification, but no other documents relating thereto."

On 12 (Re-reference to examiners), I. I. and A. I. C. suggest that the clause read thus :—

"On the publication of the provisional specification, the commissioners shall again refer the case to an examiner."

"The examiner shall report to the commissioners his opinion whether the complete specification is *reconcileable* with the provisional specification and is properly framed and clear," and I. I. wishes the third paragraph to stand thus :—

"If on the examiner considering the case for the purpose of so reporting thereon, it appears to him that, having regard to former specifications and other documents in the Patent Office, *bearing date within* 21 *years last past*, that the invention is open to objection on the ground of want of novelty, he shall report to the commissioners accordingly."

Both I. I. and A. I. C. desire that the last paragraph should read thus :—

"The report of the examiner shall then be open to the applicant, but shall not be made public by the commissioners."

On 13 (Reference to and report by law officer), I. I. desire that the third paragraph shall be so altered as to read thus :—

"The law officer shall report to the commissioners his opinion —1. Where the application has been opposed on the ground of fraud, or of the identical invention having been publicly and commonly used within 21 years last past, regard being had to the evidence adduced, whether a patent may be allowed for the invention or not. 2. Whether the invention is contrary to public morals. 3. Whether any, and if so, what, prior matter found and pointed out by the examiner, ought to be mentioned in the complete specification, so as clearly to define the applicant's claim. 4. Whether there has been discovered in the Patent Office a prior publication identical with the applicant's complete specification, and bearing date within 21 years last past."

A. I. C. do not make any similar suggestion to the above, but coincide with the I. I. in making the last paragraph read thus :—

"The commissioners may then require the applicant to amend his complete specification in accordance with the report of the law officer; but shall not make public such report.

14 (Notice to proceed), A. I. C. wish this clause and all after reference to notice to proceed, struck out, as it related (see next clause) to what appears to be an unnecessary formality.

15 (Warrant for sealing), I. I. wish this clause altered thus: —If the Law Officer *does not* report *as aforesaid against* the application the commissioners shall, on notice to proceed, prepare and submit to the Lord Chancellor a patent with a warrant for sealing thereof.

16 (Petition for sealing), I. I. suggest the following altered clause :—If the Law Officer reports against the application for any of the reasons indicated under the numbers 1, 3, and 4 in section 13 (as altered by I. I.), or if the applicant objects to amend his complete specification as required by the Law Officer, he may petition the Lord Chancellor for grant and sealing of a patent.

17 (Petition against sealing), is not objected to.

On 18 (Time for sealing), the words *publication of the* report of the Law Officer is desired to be struck out.

On 19, I. I. desire to add the following words to the end of the clause. "On the sealing of the patent the commissioners shall make public the complete specification."

On 20 (Duration of patent), no suggestion, except by A. I. C., in regard to allowance of additional time for taking out certificates of renewals of term of patent (at third, seventh, and twelfth years), ask that the petition be made to the *commissioners, subject to appeal*, if desired, to the Lord Chancellor.

By I.I., that enlarged time be limited to *twelve* months instead of three, as in the clause as it stands printed.

On 21, (the clause making the patent binding on Crown). I. I. and A. I. C. suggest that "High Court" be substituted for Treasury as the authority to *settle* the terms of use by the Crown in case of difference between the patentee and Government officials.

On 22, (patent to be revocable if not worked or used within *three* years, or licenses be not granted). Both I. I. and A. I. C. feel much averse to any such enactment whatever; but in any event suggest that *five* years be substituted for three, that subsection 1, which gives power of revocation in case of *non-user*, be struck out altogether; and that 2, providing for compulsory licenses, be altered thus :—" That it is made to appear to the *commissioners* that in order to ensure a proper supply of articles produced under the patent, or proper means for the use of the invention by the public, licenses are necessary, and the patentee, after being required by the *commissioners* to do so, fails to grant licenses to proper persons requesting the same on terms which the *commissioners* having regard to all the circumstances of the case deem reasonable.

A. I. C. concur in the alteration of Clause 22 by I. I. But A. I. C. wish to add at the end of the clause " Provided that in any case appeal may be had to the Lord Chancellor."

On Clause 23, (Foreign and Colonial Inventions). I. I. wish this clause to be altered thus :—

"Where the invention in respect of which an application is made was not first invented and used in the United Kingdom, or there is a foreign patent in force at the time of the application, or the applicant is resident out of the United Kingdom or is a subject or citizen of a foreign state, wherever resident, the following provisions shall have effect :—1. No grant if after Cesser of foreign patent to be struck out. 2. If at the time of the application there is a foreign patent for the invention in force, a patent shall not be granted unless the foreign patentee (by himself or by his attorney or agent) is the applicant (the limitation as to applying within six months from earliest foreign patent to be struck out). 3. The publication in the United Kingdom of the invention by the circulation or republication within a period of *twelve* months (instead of *six* months) of the foreign patent of a specification or other document officially connected therewith shall not affect the validity of the patent. 4. (Providing for Cesser on cessation of first foreign patent) to be struck out altogether. 5. To be struck out, which provides that if no foreign patent in existence, patent not to be granted except to actual inventor (by himself or by his attorney or agent).

6 to be struck out, which enacts, "Except as provided no patent to be granted for a communication from abroad."

The rest of the clause is not altered, so that it will be allowed to apply to colonial as well as foreign inventors, inventions, and patents.

On Clause 24 (as to amendments) no objections are offered by the Artizans and Inventors' Committee. But by the Inventors' Institute the word "claimed" is replaced by "set forth."

On 25, which enacts that the proceeding by scire facias to repeal a patent is hereby abolished. A patent shall be liable to be revoked on petition to the Lord Chancellor on any ground on which a patent might at the commencement of this Act be repealed on a proceeding by scire facias, and on any ground specified in this Act. It is proposed to add the words:—"But appeal may be had to the House of Lords upon any decision or judgment upon or in reference to any such petition."

On 26 (Assignment for part of United Kingdom), 27 (Register of proprietors), 28 (Correction of register), and 29 (Protection of inventions at exhibitions), no objections are offered.

On 30 (Foreign vessels in British waters), 31 (Patent to first inventor not invalidated by application in fraud of him), 32 (Falsification of entries in register), 33 (Penalty fifty pounds for unauthorized use of name of Patentee, mark of word patent, &c.), no objections are offered.

On 34 (False declaration made a misdemeanour) not objected to.

On 35 (Nomination of examiner) I. I. propose that it should read thus:—"The examiner to act in each case shall be nominated in the mode prescribed."

On 36 (Power for law officer to administer oaths, &c.), and 37 (Costs of opposition), no objections are offered.

On 38 (Power for Lord Chancellor to extend time in certain cases), A. I. C. desire that this power should be exercised by the *commissioners, subject to appeal* to Lord Chancellor.

On clauses 39 to 47, which relate to law procedure on patents, and 48 to 52 (as to commissioners and Patent Office) no objections are offered. But A. I. C. desire that the *County Courts should have full powers conferred upon them to deal with patent cases.*

On 53, which empowers commissioners to make rules. On the paragraph giving them power to require deposit of models. Both I. I. and A. I. C. desire to have same struck out, they also desire the expunging of the portions of the paragraph which will enable them to make a patentee pay for printing specifications.

On Clause 64, extension of the Act to existing patents. A. I. C. desires to add:—

"And the payment of the duties set forth in the schedule to this Act shall be a sufficient fulfilment and satisfaction of any condition in any such patent, or the terms of any such enactment."

On 65, I. I. desire that the words *six months* (referring to Foreign and Colonial inventions and patents), be altered to *twelve.*

The remaining clauses, which are of a legal technical character, are not objected to.

All the benefits of this Act as far as applicable to patents granted under the old law, should be allowed to patentees who apply to be placed under the Acts.

SCHEDULE OF STAMP DUTIES PAYABLE BY APPLICANT AND PATENTEE.
PROPOSED BY I. I.

	£	s.
On Application	0	10
On Patent	1	10
At end of three years	2	10
At end of seven years	4	0
At end of twelve years	4	0
Orders for Enlargement of Time of Payment:—		
At third year	1	0
At seventh year	1	0
At twelfth year	1	0
On Amendments:		
Before Patent	5	0
By way of Supplement after Patent	1	0
In any other case after Patent	1	0

Other duties, payable by opponent, and in general, are similar to act of 1852.

The Inventors' Institute and the Philosophical Society of Glasgow have fixed £12 10s. as the total sum which ought to be charged on a patent in view of the advantage to the public as well as to the inventor, and also because such a change would induce the majority of American and other foreign inventors to take out patents in England to the great benefit of manufactures and industry generally, and contribute largely to the total of stamp duties receivable under the head of patents. A moderate estimate would give £250,000 per annum instead of £150,000, as at present.

FOREIGN SCIENCE.

THE *Moniteur Scientifique*, in a recent number, contains some notes on Egyptian petroleum, by M. Frederic Weil. It serves, according to him, both as an oil for greasing of superior and lighting of inferior quality. It would suffice for the greasing of machines, mixing suitable oil with a determined quantity either of foot oil or colza oil or olive oil. M. Weil thinks the best way of employing Egyptian petroleum would be to utilise it in heating the boilers of marine engines. As a combustive it is very superior to American petroleum, in the sense that it is only inflamed at 135°, and consequently presents no danger. It is not the same we know in regard to Pensylvanian or Canadian petroleum, which, being employed as combustible, must be disembarrassed of all the oil which they contain of an inferior density of 0·783. We could equally, adds M. Weil, make use of this Egyptian petroleum, but it has the defect of containing much sulphur, and the purification of the gas which it would furnish would demand a more careful purification, and consequently be more expensive than the gas extracted from American petroleum. To sum up, M. Weil has made known a new source of petroleum which must awaken the attention of special industrialists.

For the extinction of phylloxtera in France, the Commissioner proposes various questions. Would the taking away of infested vines and those placed within a certain distance be considered as an efficacious medium? At what distance from the infected parts ought this to be practised? Should not the Government be armed with the right of breaking off finally sick vines in invaded countries?

Siduaphite is the name of a new alloy of iron, which is composed of 66 parts of iron, 23 of nickel, 4 of tungsten, 5 of aluminium, and 5 of copper. It resists sulphuretted hydrogen, it is not attacked by vegetable acids, and only slightly by mineral acids. It is really more useful than silver, and it can be prepared at less expense than German silver. We are assured that unoxydisable iron, as that is called, will perfectly replace the mixed metals which require to be silvered to hinder them from oxydising.

M. Mallet communicates to the Academy a paper "On Utilising Heat in Steam-engines." The inequality of the weight of steam does not appear to be influenced by the functionary speed of the machine. The water condensed during the admission is not entirely revaporised.

The quantity of steam really entered in the cylinder is then superior to that which the diagram of the indicator denotes. To prevent condensation in the interior of the cylinders, it does not suffice to protect them by isolating matters; we must seek to maintain them by exterior means to the initial temperature of steam.

No doubt some of the Continental inventions are rather trivial, although ingenuity is often displayed. M. Lietar has just invented a lamp of the most ingenious description. The invention is of such simplicity that it is a wonder it has not been found long ago. The lamp is composed of two parts, the reservoir which contains the petroleum, and in this reservoir a cylinder which contains the match. In the lower part of this cylinder a hole is bored of small diameter, through which the petroleum is passed in proportion, as the lamp needs its aliment. The petroleum has no longer a direct contact with the flame, and as soon as the lamp is blown out. Reverse it, and the flame is extinguished without the least danger of explosion or setting fire. M. Guillemare held lately a conference of the most interesting character upon the pine applied to domestic lighting. Twelve lamps placed upon a bench prepared for this effect splendidly lighted the end of the hall. They burned from 6 to 10 hours without spreading either smoke or smell. One of them was extinguished, then opened. M. Guillemare poured its contents into a glass at the foot, then taking a packet of lighted matches he put themout by plunging them precipitately into the liquid. Another lamp in full working was launched into space and thrown on the ground. Not only the liquid did not take fire in spreading, but moreover the lamps were extinguished.

MORTIFICATION AND WATER.

PROFESSOR J. M. Merrick, writing to the *American Chemist*, says: "In *Hoffman's Manual*, and doubtless in many other chemistries, directions are given for exhibiting the decomposition of water by sodium, the hydrogen gas being collected in a tall, narrow jar by pushing pellets of sodium under its mouth with a wire gauze spoon, etc. In both cases I used very small bits of sodium. Having blown an expensive glass tube to fragments in my own laboratory by this process, and having, in the presence of a large class, blown into minute atoms, with a noise like thunder, a large tube and porcelain cistern, covering myself with mortification and water, and cutting gashes in my hand, I venture to suggest that possibly there is a risk in this experiment, as laid down in the books."

Proceedings of Societies.

ROYAL SOCIETY.

MARCH 22ND.—Dr. Hooker, C.B., President, in the chair.—The following papers were read: "On the Variations of the Daily Range of the Magnetic Declination as recorded at Kew Observatory," by Prof. B. Stewart,—"On Stratified Discharges. IV. Stratified and Unstratified Forms of the Jar Discharge," by W. Spottiswoode,—"On Friction between Surfaces moving at low Speeds," by Prof. Fleeming Jenkin and J. A. Ewing,—and "Magnetic Observations at Kerguelen," by Rev. S. J. Perry.

April 12th.—Dr. Hooker, C B., President, in the chair.—The following papers were read: "On certain Molecular Changes which occur in Steel and Iron during the separate Acts of Heating and Cooling," by Prof. Norris,—"On the rapidity of Growth and Variability of some Madreporaria on an Atlantic Cable, with remarks upon the Rate of Accumulation of Foraminiferal Deposits," by Prof. P. M. Duncan,—"On Attraction and Repulsion of Bubbles by Heat," and "On the Constant Vibration of Minute Bubbles," by Mr. W. N. Hartley.

April 19th.—Dr. Hooker, President, in the chair.—The following papers were read: "On Putrescent Organic Matter in Potable Water," by Prof. G. Bischof,—"On a cause for the Appearance of Bright Lines in the Spectra of Irresolvable Star Clusters," by Mr. E. J. Stone,—and "On Some Figures Exhibiting the Motion of Vibrating Bodies, and on a New Method for Determining the Speed of Machines," by Prof. H. M. M'Leod and Lieut. G. S. Clarke.

CHEMICAL SOCIETY.

APRIL 5TH.—Prof. Odling in the chair.—A lecture, "On the Discrimination of Crystals by their Optical Characters," was delivered by Prof. N. S. Maskelyne. After a few general remarks on the use, to the chemist, of the methods employed by crystallographers, the lecturer proceeded to consider the methods of determining the symmetry of crystals by their optical characters. The origin and meaning of various terms used in crystallography having been explained and illustrated by models, &c., the lecturer threw on the screen, by means of a polarizing apparatus and the electric light, the beautiful coloured effects produced by crystals of cerussite, barytes, borax, &c.; the effect of heat in altering the position of the optical axes of a crystal of gypsum being especially beautiful. In conclusion the lecturer pointed out the ready means, which the examination of the optical characters of a crystal under the polarizing microscope often afforded to the chemist, of acquiring a great deal of information in a very short time, and expressed a belief that if chemists would work up suitable groups of crystals for examination by the crystallographer, very important knowledge as to the functions of various groups of molecules in a crystal would be gained.

GEOGRAPHICAL SOCIETY.

MARCH 26TH.—Sir R. Alcock in the chair.—The paper read was "On the Navigation of Smith Sound as a Route towards the Pole," by Capt. Sir G. S. Nares.

SOCIETY OF ANTIQUARIES.

MARCH 22ND.—F. Ouvry, Esq., President, in the chair.—A crowded meeting assembled to hear Dr. Schliemann's account of his excavations at Mycenæ. Lord Acton, Lord Houghton, the Master of the Trinity, Lord Aberdeen, the Rt. Hon. Spencer H. Walpole, Sir P. Malpas de Grey Egerton, and others were admitted Fellows. Among the company present were the Rt. Hon. W. E. Gladstone, Mr. A. Tennyson, Mr. F. Leighton, Prof. Colvin, Mr. J. Spedding, and others too numerous to mention. Dr. Schliemann, who had only arrived that morning from Athens, was greeted with the greatest enthusiasm.

METEOROLOGICAL SOCIETY.

MARCH 21ST.—H. S. Eaton, Esq., President, in the chair.—Capt. Fellowes, Rev. E. V. Pigott, Dr. A. Mackintosh, Messrs. R. W. T. Morris, G. Jinman, D. S. Skinner, and H. St. John Wood were elected Fellows.—The following papers were read: "Results of Meteorological Observations made at Patras, Greece, during 1874 and 1875," by the Rev. H. A. Boys. This is in continuation of a former paper, read before the Society in 1875. The period embraced in the two papers, January, 1873, to June, 1875, covers a whole winter compressed into about thirty days; a very long and showery spring; an excessively hot summer; a dry winter of extreme cold; a summer of most prolonged drought; a remarkably wet and snowy winter; a very late beginning of hot weather; and the coldest day and night, and the lowest barometer reading, for many years.—"Contributions to the Meteorology of the Pacific, Fiji," by Mr. R. H. Scott. This paper contains a discussion of all published information as to the climate of Fiji which the author has been able to discover.—"Local Diurnal Range," by Mr. S. H. Miller. This was followed by another paper on the same subject, by Mr. W. Marroitt, which discussed the questions of whether the tables of corrections for diurnal range at present used by a large number of observers are trustworthy, and whether they are applicable to different places in the United Kingdom. The conclusions arrived at were that the present corrections could not be considered as accurate, that no strictly comparable records exist for instituting a satisfactory inquiry, and that it is very undesirable to apply any corrections whatever to the observations to deduce means from them.

BRITISH ARCHÆOLOGICAL ASSOCIATION.

MARCH 21ST.—The Rev. S. M. Mayhew in the chair.—Further inspection was announced of the large Roman columns found some years ago near the East Gate, Gloucester, and most probably the Remains of a Roman temple of considerable dimensions.—Mr. Prigg reported the discovery of a Roman villa at Icklingham, with a hypocaust, found in ploughing a field, a portion of the site of the Roman station.—Mrs. Baily exhibited a misericord of the sixteenth century, having a deeply-ribbed blade, found on the site of Old St. Thomas's Hospital.—The Chairman described several objects of pottery, including a white earthenware cup of the sixteenth century, in the form of the Roman *poculum*, and two plaques from the Royal Factory of Worcester.—Mr. S. Cuming read a paper, in which he traced the history of domestic needles and their cases from the earliest times. Some curious needles used by foreign and aboriginal tribes were shown, which were formed of a species of thorn. Chinese needles are as early as those of Egypt. Employed in Europe from the earliest ages, the lecturer exhibited a large collection of needles of pre-historic date found in London and elsewhere, some at a great depth, and stated that the word meant literally "pointed wood," although most of those met with are of iron, bronze, and bone. Examples of the Saxon "naedil" were shown, and the custom of giving a needle and thread by the Burzar of New College to each student, on the 1st of January, was alluded to. Needles were made in England in 1545; before then they were mostly of foreign manufacture.—Mr. Brent exhibited a large collection of ancient needles, and the chairman many others, of the stone period.—Mr. L. Brock read a paper "On an Ancient Crypt recently demolished at Aldgate." It was at the corner of Jewry Street, and was found prior to the removal of the old houses above it. It was vaulted througout, and was of the middle of the fourteenth century. Carefully executed plans have been made for the Association as a record of the building, which will be published in the *Journal*.—A discussion followed, in which Mr. Robinson reported the discovery of an arch of the old priory of Holy Trinity, Aldgate.—Mr. G. Wright reported from Mr. Reynolds the discovery at Old Cleeve Abbey of the foundation of what was thought to be the old Refectory, running north and south, beneath the existing and later building, which is east and west.

ZOOLOGICAL SOCIETY.

MARCH 20TH.—Dr. E. Hamilton, V.P., in chair.—Mr. Sclater called attention to the fact that a two-horned rhinoceros had been killed in February, 1876, at a place some twenty miles south of Comillah, in Tipperah. This is the third recorded occurrence of a two-horned rhinoceros north of the Bay of Bengal. He also called attention to the fact that Mr. W. Jamrach had just imported a young living specimen of the rhinoceros of the Bengal Sunderbunds, which was either *Rh. sondaicus* or a very closely allied form. Mr. Sclater exhibited a small living Amphisbænian (*Blanus cinereus*), accidentally brought to England in the roots of a hothouse plant from Port St. Mary, Spain. Letters and papers were read by Messrs. C. G. Danford and E. R. Alston, on the mammals of Asia Minor, based principally on collections made by the former in that country; the list included onespecies of Bat, two of Insectivores, twenty of Carnivores, seven of Ungulates, and fourteen of Rodents; *Spermophilus xanthoprymnus*, Benn., was redescribed, and the name *Mus mystacinus* was proposed for a new species of field mouse,"—by Mr. A. C. Butler, on the Myrio poda obtained by the Rev. G. Brown in Duke of York Island; the species sent home being two in number, both of them allied to, but distinct from, previously described species, which Mr. Butler proposed to designate *Heterostoma Browni* and *Spirabolus cinctipes*,—from the Rev. O. P. Cambridge, describing some spiders collected by the Rev. G. Brown, in Duke of York Island, New Britain and New Island, two of which appeared to be undescribed, and were named *Argiope Browni* and *Sarotes vulpinus*,—by Prof. A. H. Garrod, "On the Anatomy of the Musk Deer" (*Moschus moschiferus*),—from Mr. E. Bartlett, "On the Affinity of Mesites, and the position which it should occupy in a natural classification; from an examination of structure of the feathers, Mr. Bartlett had come to the conclusion that Mesites was an aberrant form of the Ardeine group,—by Dr. Günther, "On the Fishes collected by Capt. Feilden during the last Arctic Expedition," amongst which were several of interest especially a new species of Charr, for which the name *Salmo Arcturus* was proposed; this Charr was discovered in freshwater lakes of Grinnell Land, and was stated to be the most northern freshwater fish known to exist,—by Mr. E. Newton, "On a Collection of Birds made in the Island Anjuan or Johanna, one of the Comorro group, by Mr. Bewsher, of Mauritius," whereby the number of species now known to have occurred in that island was raised to thirty-five, of which fourteen were first observed there by that gentleman; five of these, namely, *Zosterops Anjuanensis*, *Tchitrea vulpina*, *Ellisia longicaudata*, *Turdus Bewsheri* and *Turtur Comorensis*, were1 escribed as new.

GEOLOGICAL SOCIETY.

MARCH 21ST.—Prof. P. M. Duncan, President, in the chair.—Messrs. W. B. Coltman, W. J. Grimshaw, and A. Ross were elected Fellows. The following communications were read: "On the Strata and their Fossil

Contents between the Borrowdale Series of the North of England and the Coniston Flags," by Prof. R. Harkness and Dr. H. Alleyne Nicholson,—and "On a New Area of Upper Cambrian Rocks in South Shropshire, with the Description of a New Fauna," by Mr. C. Callaway.

April 11th.—Prof. P. M. Duncan, President, in the chair.—Messrs. J. R. Campbell, J. Carter, W. R. Ellis, W. H. Merritt, W. Morgans, and E. A. Parsick were elected Fellows.—The following communications were read: "On Sand-worn Stones from New Zealand," by Mr. J. D. Enys,—"On the Bone-caves of Creswell Crags," third paper, by the Rev. J. M. Mello,—and "On the Mammal-fauna of the Caves of Creswell Crags," by Prof. W. B. Dawkins.

ASIATIC SOCIETY.

April 16th.—Sir E. Colebrooke, Bart., President, in the chair.—Sir D. Forsyth was elected a Resident Member.—Mr. J. W. Redhouse read a paper, in which he suggested the identity of the "zodiacal light" with the phenomenon called the "Wolf's Tail" and the "False Dawn" in Arabic, Persian, and Turkish; which described by Orientals as being seen in the eastern sky, in the shape of a tall, slender pillar of faint light, a short time before the appearance of the "true dawn" or daybreak. "The Hebrew term," he added, "for the dawn is rendered by ὄρθρος in the Septuagint which is also the name of the "two-headed dog of Geryon," killed by Hercules in his Tenth Labour. Can any connection be traced between this "two-headed dog" (perhaps the zodiacal light of the morning and evening) that watched over Geryon's herds under the setting sun, and the "Wolf's Tail" of the Easterns? The Arabic word rendered, unequivocally, in Persian by "wolf" is also the "name of a certain dog" and of "two different horses." Do the Vedic hymns offer any clue to the solution of these myths?

ROYAL SOCIETY OF LITERATURE.

March 28th.—Sir P. de Colquhoun, Q.C., in the chair. Mr. Washington Moon read a paper "On the English Language."

April 25th.—Anniversary Meeting.—The following gentlemen were elected officers for the year: President, H.R.H. the Prince Leopold; Vice-Presidents, the Duke of Devonshire, the Very Rev. the Dean of Westminster, Major-Gen. Sir H. C. Rawlinson, H. Fox Talbot, Sir P. de Colquhoun, Sir C. Nicholson, Bart., Lieut.-Gen. Sir C. Dickson, the Rev. C. Babington, C. Clark (Treasurer), and C. M. Ingleby; Council, W. A. T. Amhurst, W. de Gray Birch (Hon. Librarian), J. W. Bone, E. W. Brabrook, C. H. E. Carmichael, Rev. Dr. Dicksee, C. Goolden (For. Sec.), T. B. Green, E. G. Highton, W. Knighton, C. H. Long, G. W. Moon, J. A. Rose, H. T. Steward, W. S. W. Vaux, (Secretary), H. W. Willoughby.

ROYAL INSTITUTION.

April 2nd.—G. Busk, Esq., Treas, and V.P., in the chair.—Mrs. S. Bircham, Sir R. Burnett, Bart., Dr. J. Edmunds, and Mr. B. Goolden were elected Members.

SOCIETY OF ARTS.

April 4th.—E. Lawrence, Esq., in the chair.—Eight new Members were proposed for election. The paper read was "On the Pioneer Railway," by Mr. F. J. Rowan.

April 10th.—Mr. C. Johnstone in the chair.—The paper read was "On the Social State and Prospects of the South African Communities," by Mr. R. Richards.

April 11th.—Lord de la Warr and Buckhurst in the chair.—Nine new Members were proposed for election. The paper read was "On Compensation for Injuries received in Industrial Occupations," by Mr. T. A. Brockelbank.

April 12th.—Dr. Wright in the chair.—The paper read was "On the Cinchona Alkaloids, their Sources, Production, and Use," by Dr. B. H. Paul.

April 18th.—Major Donnelly in the chair. Four new Members were proposed for election. A lecture was delivered by Mr. E. J. Reed, "On the Modifications which Ships of War have undergone during the last Twenty Years."

PHOTOGRAPHIC SOCIETY.

April 3rd.—J. Glaisher, Esq., President, in the chair.—Mr. H. B. Pritchard was elected Hon. Sec. A discussion on a paper by Mr. J. Spiller, "On the Silver Bath, its Defects and Restoration."

INSTITUTION OF CIVIL ENGINEERS.

March 27th.—Mr. G. R. Stephenson, President, in the chair.—The paper read was, "On the River Thames," by Mr. J. B. Redman.

April 10th.—Mr. G. R. Stephenson, President, in the chair.—Eight gentlemen were elected as Members, viz.: Messrs. J. Armstrong, S. Barrass, J. Carrick, P. Denny, J. D. Ferguson, C. A. Harrison, A. L. Holley, and C. Knightley Orlebar; and seventeen as Associates, viz: Messrs. R. C. F. Annett, J. Atkinson, J. Bernays, W. Boulton, F. Briffault, J. T. Brown, E. M. Eaton, J. G. Killey, J. Lawson, R. W. Maxwell-Müller, J. T. Middleton, W. E. Shaw, I. Shone, A. Stewart, H. J. Tingle, A. W. Tyrrell, and W. Westhofen.

SOCIETY OF ENGINEERS.

April 9th.—Mr. T. Cargill, President, in the chair.—The following gentlemen were elected Members:—Lieut. W. H. Bixby, M. Jose S. Camacho, Messrs. J. Johnson, A. Le Grand, R. Sutcliff, J. W. Wilson, jun., and F. Pontifex. The paper read was, "On the Priming of Steam Boilers," by Mr. W. Major.

MICROSCOPICAL SOCIETY.

April 4th.—H. C. Sorby, Esq., President, in the chair.—Mr. D. Bogue was elected a Fellow. The following papers were read: "On the Variability of the Chlorophyll Bands in the Spectrum," by Mr. T. Palmer, in which he described the various effects produced by solutions in water and alcohol, and by treatment with acids and alkalis,—"On the Mineralogical Constitution and Microscopical Characters of the Whetstones of Belgium," by M. l'Abbé Renard, of Louvain,—"On the Microscopical Characters of Krupp's Silica Cotton," by Mr. H. J. Slack,—and "On the Dower Silurian Lavas of Ercott Hill, Cumberland," by Mr. C. Ward, in which it was shown that the difference between ancient and modern larvas was not so great as was usually supposed, their actual constituents being very nearly the same, though apparently they differed, owing to conditions which has produced metamorphosis in the earlier series.

PHYSICAL SOCIETY.

March 17th.—Prof. G. C. Foster, President, in the chair.—Mr. W. S. Seaton was elected a member. Mr. Spottiswoode exhibited some experiments on the stratification of the electric discharge in vacuum tubes, and described his attempts to produce the effects, as obtained by Mr. Gassiot and Mr. De la Rue, with batteries of several thousand cells, by means of the induction coil. Capt. Abney, R.E., read a paper "On the Photographic Image," prefacing it by a brief account of the two theories, the chemical and the physical, which are held regarding it. Mr. O. J. Lodge proposed a modification of Mance's method for determing the intensity of an electric current.

April 14th.—Prof. G. C. Foster, President, in the chair.—The Secretary described a new form of colorimeter, devised by Dr. Mills. It consists of two vertical glass tubes, about ten centimètres in length and two centimètres in diameter, and contracted at their lower ends, which are graduated in millimètres, and fixed in a vertical frame. In each tube a loosely-fitted disk of white or black glass (as occasion may require) can be raised or lowered from below by means of a glass rod, and the edge of the concave meniscus of the liquid is concealed from view by an opaque ring above it. The two liquids under examination are introduced into the tubes to the same level, and the disks adjusted until rendered invisible. Mr. Christie gave an account of a new form of spectroscope, in which "half-prisms" are used to magnify the dispersion.

MATHEMATICAL SOCIETY.

April 12th.—Lord Rayleigh, President, in the chair.—Mr. C. Pendlebury was elected a Member.—The following communications were made to the Society: "On Hesse's Ternary Operator and Applications," by Mr. J. J. Walker, "Geometrical Illustration of a Theorem relating to an Irrational Function of an Imaginary Variable," and "On the General Differential Equation $\frac{dx}{\sqrt{X}} + \frac{dy}{\sqrt{Y}} = o$, where X, Y are the same Quartic Functions of x, y respectively," by Prof. Cayley, "On Some Cases of Parallel Motion," by Mr. H. Hart, and "A Method of solving Partial Differential Equations which have a general First Integral, applied to Equations of the Third Order with Two Independent Variables," by Prof. H. W. Lloyd Tanner.

QUEKETT MICROSCOPICAL SOCIETY.

March 23rd.—Dr. J. Matthews, V.P., in the chair.—Three new members were elected. A paper was read by Mr. W. H. Gilbert, "On the absence of Stomata from certain Ferns." Mr. T. C. White communicated to the meeting the successful result of his observations and investigation into the nature of a doubtful organ which he had frequently observed attached to the third tail-segment of a species of marine cyclops.

LINNEAN SOCIETY.

April 5th.—Prof. Allman, President, in the chair.—Capt. Chimmo, the Rev. J. Constable, and Prof. Liversidge were elected Fellows. Sir. C. Strickland exhibited a specimen of *Crinum aquaticum*, obtained from Grahamstown, South Africa, a plant which hitherto has rarely been seen in flower in Britain. A paper "On Ferns Collected by Miss Gilpin in the interior of Madagascar," was read by Mr. J. G. Baker. Some hundred and fifty species had been obtained, whereof the author regarded seventeen as new; many of the others also tended to elucidate points in species already partially known. This series, as also that of Mr. Pool's, laid before the Society about a year ago, showed how much has yet to be done in working out the Madagascar flora. The Secretary announced a paper "On the Freshwater Algæ of the Cape of Good Hope," by Prof. Reinsch; this, being of a technical character and in Latin, was taken as read. Mr. R. Collett read a communication "On *Myodes lemmus* in Norway." His observations on the habits and economy of the Lemming had extended over several years, and in 1876 he had published remarks on them in one of the Norwegian scientific journals. His attention had since been called to Mr. Crotch's contributions in the Society's journals; and as in many particulars he differed from that author, the present notice resulted. The number of young at a birth vary from three to eight, and two sets are annually produced. He regards their wandering as a necessary consequence of their temporarily strong vitality, together with a migratory instinct. The tendency at intervals to appear in unusually large numbers is not confined to the genus, but is common to all the species of the subfamily Arvicolinæ. The majority of the wanderers are young, and in one instance observed were chiefly males. The migration closes with the death of the individuals, generally brought about by an epizootic disease, the result of over-population: the denser the masses, the higher the rate of mortality. The bare patch on the rump, considered by Mr. Crotch to be due to the habit of protecting themselves against stones in resisting attack, Mr. Collett believes to be produced by a skin disease. The latter author confirms the former as to the number of winged and four-footed enemies which devour the Lemmings, and also that domestic cattle and reindeer destroy them. Their occasional enormous increase in numbers Mr. Collett holds to be owing to periodic prolific years, the facility of rearing their young, and the early breeding of the latter. Parallel instances among other groups of animals,—for instance, unusual swarms of butterflies, &c.,—are well known, though, as to the true reason of such fluctuations in numbers, much is only conjectural. Coincidently with the notable years of the Lemming migrations, the increase above the normal number of rats, mice, shrews, and even the grouse tribe have been recorded. Mr. Collett affirms that the Lemmings travel chiefly in the direction of the valleys, and not constantly due west; their great movements are chiefly at night. He is inclined to question Mr. Crotch's notion of hereditary search for a "Miocene Atlantis," and rather believes that in accounting for the periodical excess of multiplication and migratory impulse a physiological necessity impels, at present beyond our power to explain rationally. A contribution, "On the Natural History of Swine," by Prof. Rolleston, was read in abstract, this paper forming an appendix to that previously brought under the notice of the Society. The Liverworts (Hepaticæ) collected by the Rev. A. E. Eaton, near Cape Town, formed a paper by Mr. W. Mitten, the title only of which was read, as also "On some New Irish Lichens," by the Rev. W. A. Leighton.

ENTOMOLOGICAL SOCIETY.

APRIL 4TH.—Prof. Westwood, President, in the chair.—Messrs. G. Harding, C. A. Briggs, and J. T. Carrington were elected Ordinary Members; and Messrs. E. H. Birchall, T. D. Gibson Carmichael, and V. Cluse were elected Subscribers. The Secretary exhibited a collection of fine species of Lepidoptera, from a place about twenty miles from Bangkok, in Siam, forwarded to him by Mr. R. Garner, of Stoke-upon-Trent. Mr. M'Lachlan exhibited a specimen of *Ophideres materna*, a brightly-coloured exotic species of Noctuidæ, given to him by Mr. R. H. Scott, with a note to the effect that it was taken at sea in lat. 25° 24 S., long. 69° 10′ E. (the nearest land being the island of Mauritius, about 360 miles distant), by Capt. Raeburn, of the ship *Airlie*. The moth is a common Indian species, but is found also in Africa. A specimen was long ago received from Brazil, and Mr. Grote had recently noticed its occurrence in Florida. He also exhibited a cocoon and pupa of a species of Cetoniidæ (probably *Diplognathus silaceus*) from Cameroons, sent to Mr. Rutherford. The cocoon appeared to be formed of dark-brown earth, but attached thickly to the exterior were oval, slightly flattened, deep black, hard bodies (each nearly five lines long by two broad), which he thought were probably the excrement of some rodent animal. Mr. Champion exhibited *Stenus Kiesenwetteri* (hitherto only found in this country at Wimbledon), *Gymnusa brevicollis*, *Bembidium nigricorne*, and *Plociomerus luridus*, all from Chobham. Also *Philonthus cicatricosus*, from Shoreham. Mr. H. Vaughan exhibited (on behalf of Mr. Bidwell) a specimen of *Notodonta trilophus*, taken about the year 1867, by a lamplighter at Ipswich, who had it alive with several specimens of *N. ziczac*. It was only the second (authentic) capture of the insect in this country, the first having been found at St. Osyth, in Essex, by Mr. Douglas. The President read a letter he had received from Mr. B. G. Cole respecting the subject of Seasonal-Dimorphism in Lepidoptera. He observed that from a number of eggs laid by *Ephyra punctaria*, those that emerged in July were of the spotted variety, while those which remained in the pupa state till the following May in all respects resemble the mother. Mr. Cole referred to some remarks by Dr. Knaggs, published in the *Entomologists' Monthly Magazine* (vol. iii. p. 238), as bearing on the same subject. He considered it probable that the insects that were produced by a slow process of development would produce the May form (which might be considered the type), whilst those whose development was hastened by the heat and light of summer would produce smaller and less perfect insects. Mr. M'Lachlan alluded incidentally to the Lepidoptera brought home by the Arctic Expedition from the far north (82° N.), and said that the larvæ of of most of those species must, of necessity, require more than one season to acquire their full growth; for the short and fitful summer was utterly inadequate for the full development in one season of most of the species, and, furthermore, it was probable that the pupa state might, habitually, last several years. The President read "Notes upon a Strepsipterous Insect, parasitic on an Exotic Species of Homoptera (*Epora subtilis*, Wlk.), from Sarawak," accompanied by drawings illustrating the metamorphosis. He also read "Notes on the Genus Prosopistoma," especially with regard to the species from Madagascar described by Latreille, of which he exhibited the types. Mr. Cameron communicated a paper "On East Indian Tenthredinidæ;" and Mr. Butler a paper "On the Lepidoptera of the Amazon Valley, collected by Dr. Trail in the Years 1873—75." Mr. Baily communicated "Descriptions of New Species of Halticidæ," and Mr. C. O. Waterhouse, a "Monograph of the Australian Species of the Coleopterous Family, Lycidæ." Mr. F. Smith read "Descriptions of New Species of the Genera Pseudomyrma and Tetraponera, belonging to the Family Myrmicidæ."

STATISTICAL SOCIETY.

APRIL 17TH.—A paper, entitled "Births, Deaths, and Marriages, and the Comparative Progress of Population in some of the Principal Countries of Europe," by Mr. F. Martin, was read.

ASTRONOMICAL SOCIETY.

APRIL 13TH.—Mr. W. Huggins, President, in the chair.—Mr. F. Newton was elected a Fellow. The President announced that the Council had voted £250 towards the expenses of Mr. Gill's expedition for observing the opposition of Mars. Three members of the Council of the Royal Society had also guaranteed that, if the remainder of the sum required is not advanced out of next year's Government grant of £4,000 to the Royal Society, they will themselves contribute £250 between them to the expedition. Lord Lindsay gave a verbal account of the methods he has employed in reducing his observations of the opposition of the planet Juno. The value of the solar parallax deduced by one method is 8·82″, and by another method is 8·81″. The observations and reductions are now ready for printing, and will be published as Vol. II. of the Dun Echt observations. Mr. Gill gave an account of his proposed expedition to the Island of Ascension, and announced that he hoped to be able to secure observations of the diurnal parallax of three of the minor planets, which come to opposition about the same time as the planet Mars. Ariadne will come to opposition on the 24th of July, and and its distance from the earth will be only 0·83. The sun's distance being taken as unity, its declination will be 15° south, so that the geometrical conditions of the station at Ascension will be very favourable. The other two minor planets are Melpomene and Iris. Melpomene will have a declination of 2° north, and Iris will be less favourably placed. Mr. Christie gave an account of his new half-prism spectroscope, an instrument which increases the length of the spectrum operated upon without increasing its purity. With a comparatively small direct vision instrument he obtains a dispersion equivalent to 160 prisms of 60°. Notes, by the Rev. S. J. Perry and Mr. Rand-Capron, were read, describing their search for the planet Vulcan on the 20th, 21st, and 22nd of last month. No planet was seen. Mr. J. W. L. Glaisher read a paper "On an Elliptic Function Solution of Kepler's Problem."

ANTHROPOLOGICAL INSTITUTE.

APRIL 10TH.—J. Evans, Esq., President, in the chair.—The President exhibed two stone instruments from Sandoway District, North Burmah. Some flint arrowheads, scrapers, &c., from Ditchley, Oxon, were exhibited by Capt. H. Dillon. A paper, "On some Rude Stone Monuments in North Wales," was read by Mr. A. L. Lewis. The chief point of interest being the existence of single outlying stones on the north-east of the circle near Penmaenmawr, which is thus shown to conform to, and to lend further confirmation to, the rule found by him to exist generally in British circles, of a special reference to the north-east by outlying stones or otherwise. Papers were also read:—"On Some Curious Coincidences in Celtic and Maori Vocabulary," by the Rev. W. Ross,—and "On Australian Aboriginal Languages, Traditions, &c.," by Messrs. Greenway, M'Donald, Rowlay, Malone, and Dr. Creed. Col. A. Lane Fox, Messrs. Hyde Clarke, Walhouse, Moggridge, Park-Harrison, and the President, took part in the discussion.

A FOUNTAIN ON A SPIRE.

The Virginia (Nev.) *Enterprise* of March 6 says: "Last evening, about 4 o'clock, the eyes of hundreds of persons in the streets were directed towards the top of the spire of the new Catholic church, where was seen a fountain spouting numerous jets high in the air. A large iron pipe is carried up through the steeple and up the large cross surmounting the same. The pipe then takes the form of the cross, behind which it is hidden, and from holes perforated at proper intervals the jets are sent up. From the top of the cross and from the end of each arm large streams ascend to the height of about 25 feet, and between these are thrown up a great number of smaller jets. The height of the top of the cross from the ground is 170 feet, and last evening, the air being calm, the numerous jets spread out in the shape of a fan. The rays of the declining sun fell upon the jets and spray at just the proper angle to light up and bring out the whole in a beautiful roseate glow which surrounded the top of the cross like a glory. This novel fountain was not constructed for mere ornament. It is intended for use in case of the breaking out of a large fire, as a protection to the spire and roof of the church. It is but the work of a moment to turn on the water and drench the spire. The height to which the water is thrown above the cross shows the great force of the water works of the city."

RECENT AMERICAN PATENTS.

Rotary Cultivator.—Sevier Tadlock, Hope, Tex.—This is an improved machine for opening ditches to drain land and form fences, and to grade railroads, &c. Upon the rim of a large, apart, are attached cross spades, and hinged right-angled spades, which form three sides of a series of rectangular boxes. A chute covers the open tops and sides of the boxes, and extends to below the wheel to cut the bottom and on one side of the slice of soil while the spades cut its other side, thus dividing it into cubical blocks. As the machine is carried forward, the spades carry up the blocks of soil through the chute and discharge them into the trough. A carrier screw is operated by the advance of the machine, to move the soil deposited in the trough outward, and drop it to the ground.

Washing Machine.—Henry P. Lentz, Somerset, Ohio.—This invention relates to certain improvements in that class of washing machines called pounders, the same being adapted to pound the clothes in a open tube with a vertically reciprocating movement for the purpose of cleansing the same by an agitation of the water produced by the impact of the plunger and the production of air currents. The improvement consists in the peculiar construction of the plunger, whereby the clothes may be more readily and thoroughly cleaned, and the splashing of the water outside of the tub more effectually prevented.

Combined Sash Lock and Holder.—Sylvester J. Tucker and Massena E. Gary, Richmond, Va.—The object of this invention is to provide an improved form of combined sash lock and sash holder which shall automatically maintain the sash in any elevated position, holding the same at any desired height without danger of falling, and which shall also be so arranged as to lock the sash when lowered, so as to prevent access to the building from the outside of the window. To this end the improvement consists in combining a rubber-faced cam-headed lever for supporting the sash by frictional contact, a spring for pressing the cam against the window frame, and a pivoted bar which, in one position, forms a bearing for the thumb or finger to rest upon while lifting the end of the cam-headed lever when raising the sash, or which may be thrown over on its pivot to engage with a notch in the window frame when the sash is down, to lock the same against all efforts to raise it from the outside.

Wood Grinder for Paper Pulp.—Joseph O'Gregg, Elkhart, Ind.—The wood to be reduced to pulp is placed in guide boxes. Weighted followers force the wood against a grindstone having a beveled and grooved periphery, and as the stone is revolved the fibre is separated, and washed away by a jet of water.

Desk.—Olaus Hansen, Cedar Vale, Kan. This is a vertical desk, wardrobe, or other analogous article of household furniture, having the end recesses, corner posts, and folding doors connected with the latter by flat hinges, whereby the said doors are adapted to swing round the posts and lie concealed in the recesses behind them. The doors are thereby not in the way, occupy no space, and may be readily closed again after use.

Stair Builders' Tool. — Theodore Simonson, Hillsborough, Ohio.—This invention relates to the class of tools used by stair builders in getting the pitch, bevels, and length of wreaths or twists in hand rails. It consists of two bars of wood hinged together, having at their free ends adjustable slotted pieces which are held in place by thumb screws. The instrument avoids the complication of geometric lines, usually resorted to, and accomplishes the desired result with two simple lines.

Bale Band Stretcher.—Charles M. Pearre, Galveston, Tex.—The object of the invention is to provide a convenient and easily handled bale band stretcher, to be used in bailing cotton, hay, &c., for the purpose of taking out the slack of the band that cannot by taken out by hand while the bale is under the press. To this end the improvement consists in a bar carrying at its end a gripping device for one end of the band, and a guide socket, in combination with an elbow lever pivoted at its end to a slide bar moving through said guide socket, and carrying also a gripping device for the other end of the band, which two gripping devices are adapted to be brought together by bringing the handles of the elbow lever and bar together, and tilting the elbow lever upon its angle, at which point it is attached to the bar by a keeper, and slides over an inclined portion of the same upon rollers.

Bale Tie.—Joseph C. DuBois, Tuscaloosa, Ala.—This invention relates to that class of bale ties which are made of hoop iron, and applied to form a tie without bending either end. It consists of a band whose one end is slotted while the other is perforated, the two secured together by a wire. Its construction is such that the cost of manufacture is very trifling, while it possesses efficiency and durability.

Argand Gas Burner.—Samuel B. H. Vance, New York city, assignor to Mitchell, Vance, & Co., of same place.—This is so constructed as to prevent the hissing noise of the gas, and to enable the flow of gas, and, consequently, the amount of light, to be regulated as desired. There is a new valve which may be adjusted to admit of the passage of any desired amount of gas.

Rein-supporting Attachment for Neck Yokes.—Charles R. Hicks, Mount Sterling, Ill.—This invention consists in attaching to the upper part of the neck yoke a supporting plate with raised center part, having screw holes with different inclination, into which an arm with pivoted end link and swiveled ring is secured, to secure the lines at their point of crossing. This prevents the lines from becoming entangled beneath the tongue.

Curry Comb. — Giles H. Hawrican, North Hero, Vt. — This implement is formed of a straight blade, convexo-convex in cross section, and provided on one side with beveled teeth having their points adjusted in line. This construction adapts the comb to be used equally well upon those parts of the body of the horse or other animal which are sinuous or angular as upon those which are smooth or gently rounded.

Ruler.—Charles M. Hayes, Silver City, Idaho Ter. — The invention relates to parallel rulers, and consists in making a slot longitudinally—in the wood, metal, gutta percha or other material of which it may be made—in order enable the user to sit at a table or desk, and without rising, stooping, or changing his position, to see the figures under which a balancing line is to be drawn, the same being thus readily accomplished without the least danger of a blot.

CHRONOLOGICAL LIST OF
APPLICATIONS FOR LETTERS PATENT.

⁂ In this list (Com. means Invention communicated from abroad.

Further information, as to the progress of these Patents by Notice to Proceed, Sealing, and Specifying, can be obtained at the Office, 21, Cockspur-street, Charing Cross.

On September 30th.—3803 to 3809—J. P. Barbier. Forming with agglomerated materials, by means of moulds or such like apparatus, factitious stones of all sizes fit for the stonework of any building.—H. Lavie. Heels for boots and shoes.—H. Bezer. Apparatus to be used in rinks for indicating the direction in which the skaters have to travel.—S. Beddow and W. Sturmey. Locks, and the manufacture of them. —W. J. Hodge. Construction of roller and other skates.—J. A. Eahie. Closing doors and gates (com.)—J. Dickinson. Machinery for drilling and turning the parts of boilers, and for other similar uses.

On October 2nd.—3810 to 1821.—C. N. Nixon. Construction of pinions for actuating wheels and machinery, and the method of pawling pinions and wheels of every description.—W. Onion. machinery and apparatus for making fashioned hosiery.—T. Henderson. Self-cleaning furnaces.—C. Wicksteed. Coiling gear of steam ploughing and other engines.—H. Bate. Velocipede.—G. Budd. Construction of umbrellas and parasol.—W. S. Williamson. Treatment of refuse from iron furnaces, and apparatus to be employed in such treatment.—W. Bown. sewing-machine shuttles.—G. Bailey. Plaining, shaping, slotting, and other similar machines. F. Greenhough. Method of and apparatus for lighting fires.—J. B. Bailey. Machinery and apparatus for the manufacture of paper tubes. W. R. Lake. Saws for cutting stone and similar materials, partly relating to embedding and securing diamond points or teeth in metal plates (com.)

On October 3rd.—3822 to 3833.—C. G. Hawkins. Screw or worm gearing for transmitting or modifying motion.—A. M. Clark. Treatment of grain and seeds of all kinds, plants, and all vegetable matters generally, for the preservation of the same from decay and disease, the attacks of insects, and other destructive agents (com.) —J. C. Sellars. Erecting buildings of concrete, and apparatus employed therein.—G. Double. Drilling-braces, applicable also to the imparting of rotary motion for other useful purposes.—T. Lees. Sawing machinery.—F. Pearn and S. Pearn. Construction of steam engines and boilers.—T. Haynes. Lubricators. (Complete specification.)—J. E. F. Lüdeke. Method of obtaining and utilising centrifugal force for motive power.—F. Tommasi. Hydro-thermic motive-power engine.—G. Greig. Steam cultivators.—E. C. Chaninel. Ladies' bow or cravat fasteners (com.)—A. W. Pocock. Portable apparatus for cutting mortices and slots in timber and wood work generally.

On October 4th.—3834 to 3847.—J. Holden. Receptacles suitable to contain acids and corrosive liquids.—J. H. Johnson. Knitted fabrics, and machinery for producing the same (com.)—F. G. Morton. Apparatus for treating paraffin and other fats or fatty matters.—A. W. Adams. Box or mould to be used in connection with machinery for manufacturing ice.—O. L. Whitaker, W. A. Whitaker, J. Pearson, and L. Entwistle. Apparatus employed in machinery for spinning cotton or other fibrous substances.—C. D. Abel. Inkstands (com.)—J. Butterworth, W. Dickinson, and C. Catlow. Looms for weaving.—J. Harris. Motive-power engines.—W. R. Lake. Method of and machinery for uniting pieces of leather or other materials, which is also applicable for sewing the soles of boots and shoes, for manufacturing harness, and for other like purposes (com.)—J. J. Sachs. Apparatus for use in treating animal and vegetable substances in order to facilitate the impregnation or the exhaustion thereof of aeriform or other fluid.—W. P. Tilton. Preparation of matters for use in purifying syrups, oils, and other liquids (com.)—W. C. Stiff and A. Bowen.—Machinery for the manufacture of screws.—B. J. B. Mills. Machinery or apparatus for cutting or breaking sugar (com.)—W. H. Percival. Folding chair.

On October 5th.—3848 to 3857.—J. Mactear. Utilising bye products of the soda and potash manufactures.—T. Chutter and G. F. Chutter. Signalling apparatus.—W. Baker. Production of iron and steel.—G. A. F. Fowke. Sewer and drain pipes.—W. R. Lake. Machinery for manufacturing screw nuts (com.)—J. Richards and J. Tandy. Solitaires, sleeve-links, collar and other studs, fastenings for articles of dress and jewellery, bags, and other articles.—H. C. Jobson, A. H. Jobson, and H. Johnson, junr. Construction of coal tubs, also partly applicable to the construction of railway waggons and other vehicles.—R. H. Hughes. Means employed to indicate the waste or overflow of water from cisterns and other receptacles.—W. Smith. Protractor or instrument for ascertaining angles of elevation and depression (com.)—J. H. Johnson. Portable ovens (com.)

On October 6th.—3858 to 3876.—H. Carter. Roller skate.—A. C. Henderson. Infants' feeding bottles (com.)—F. G. Myers. Punching and eyeleting leather or other material.—J. Peebles. Railway brakes.—G. Butler. Furnaces.—A. D. Turner. Apparatus for burning hydro-carbons for lighting and heating purposes.—D. Gill. Twin-door with automatic mechanism, to be employed for sanitary purposes. (Complete specification.)—E. Lewis. Pipes for smoking, and cigar holders.—J. Hodgson. Apparatus for punching, stamping, cutting, or perforating paper with numbers, letters or signs, either seriatim or otherwise.—W. B. Woodbury. Magic lanterns and apparatus to be used with the same (com.)—A. Taylor. Drain pipes.—E. J. Howell. Construction of railway and tramway carriages and apparatus connected therewith.—E. H. Stutter, J. Stubbs, and J. Corrigan. Apparatus for threading or passing weft yarns or threads through the eyes of shuttles used in looms for weaving. (Complete Specification.)—J. Mackenzie. Rendering marine governors more effective.—J. R. Readett. Machinery for cutting rags, fodder, and litter. — G. Laysell. Planing machines.—J. C. Garrood. Construction of bicycles and other velocipedes.—J. W. Corbett. Colouring bricks, pipes, tiles, and other shaped articles.

On October 7th.—3877 to 3893.—F. Erskine. Furnaces and fire bars for steam boiler and other furnaces.—W. Cook. Tools or cutters for shaping wood.—S. Young. Apparatus for obtaining motive power.—H. Green. Coal-gas scrubbers and apparatus for distributing liquid for other purposes.—J. Wrigley. Compositions adapted principally for application to straps or belts and bands.—J. McKendrick, H. W. Ball and R. G. Watson. Fluid motor, pump, or meter, and valves and valve gearing therefor.—L. A. Aspinwall. Construction of potatoe diggers.—J. R. Martin. Rotary pumps and engines.—T. L. Parker. Treating tobacco and means employed for that purpose.—M. O. Camroux and J. Quick. Pipes for smoking tobacco.—R. Knott. Machinery or apparatus for cleaning knives.—G. F. Lutticke. Construction of acrobatic toy figure.—B. J. B. Mills. Horse shoes and horse shoe blanks, and machinery for manufacturing same (com.)—G. Gent. Artists' easels.—F. Wirth. Braiding machines (com.)—W. R. Lake. Lasting of boots and shoes, and machinery therefor (com.)—T. Lane. Furnaces and fireplaces designed to economise combustion of fuel and prevent production or escape of smoke from the same.

On October 9th.—3894 to 3901.—W. Young, A. Neilson, and A. Young. Destructive distillation of bituminous substances, and apparatus or means employed therefor.—M. F. C. Turpin. Manufacture of parquet flooring.—F. Wirth. Bleaching animal fibre (com.)—D. Davidson. Steam boilers.—J. Smith. Mechanical stoking apparatus for boiler and other purposes.—J. T. H. Richardson. Spittoon for railway or other carriages or vehicles, or for other places.—G. Anderson. Ventilators.—W. R. Lake. Machinery for separating grain or seed from dust, chaff, and other refuse matter (com.) (Complete Specification.)

On October 10th.—3902 to 3922.—M. Lyons, L.S.A. Making medicated sweetmeats.—R. W. Hellyer. Self-acting stop for doors and other appliances.—F. Siemens. Pottery or calcining ovens or kilns, and the means of utilizing the waste heat thereof, and apparatus employed in connection therewith.—W. L. Wildy. Cocks or valves for gas fittings.—B. Hunt. Life-preserving travelling satchel or purse (com.)—J. L. Haddan. Stone dressing machines (com.) (Complete specification.)—J. McGill. Arranging, cutting, and parcelling railway or other tickets and the apparatus employed therefor.—G. Ashworth, R. Ashworth, and E. Ashworth. Wire or metal brushes or brushing and carding appliances, and apparatus for manufacturing the same.—J. McGill. Construction of cabinet for the arranging and preserving of way bills or other documents in railway or other parcel forwarding offices.—A. D. Turner. Sewing machines.—I. Evans. Braces for suspending trousers.—J. Jowett. Apparatus for preventing the vibration or rattling of sliding windows and for retaining them in position.—H. C. Ahrbecker. Fluid meters.—W. J. Beard and G. Stephenson. Hand and power washing machines.—J. Shand. Hydrants or fire-cocks, and an auxiliary valve in connection with the same.—J. C. Meinen. Apparatus for supplying hot-water, coffee, and other beverages, in restaurants and other public establishments. — F. Larard. Hinges. — A. Shand. Take-up mechanism for sewing machines. — J. A. Huggett. Manufacture of wrought nails.—T. Forster. Manufacture of double texture waterpoof fabrics.—J. Bertram. Boxes for receiving cigar ashes, applicable especially for the smoking carriages of railway trains.

On October 11th.—3923 to 3936.—H. A. O. E. Grünaum. Preventing gunpowder and other combustibles exploding during storage or transmission.—J. A. Lund. Apparatus for synchronizing clocks or other time keepers and for transmitting seconds or other time or intermittent currents.—J. H. Johnson. Pianofortes and other keyed musical instruments (com.)—T. Dawson and T. Allen. Dress fasteners.—J. L. Haddan. Refrigerators or preserving chambers (com.) (Complete specification.)—W. A. Comber. Fire-lighters.—W. Crawford. Bleaching, washing, and dyeing yarns in hanks, and the machinery or apparatus employed therefor.—P. J. Carmien. Casters for furniture, skates, and other articles.—G. Buchanan. Manufacture of new fibrous material to be used for pulp and other like purposes.—H. A. Cowell. Improvements in machinery for pressing or shaping hats (com.) (Complete Specification.)—G. Allan. Method of and apparatus for damping paper in connection with web printing machines.—E. Hely. Machines for printing, stamping, or embossing.—H. Sunderland. Machinery for crushing, grinding, or pulverizing.—J. Y Smith. Ejectors for exhausting air.

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